FOOD INDUSTRIES

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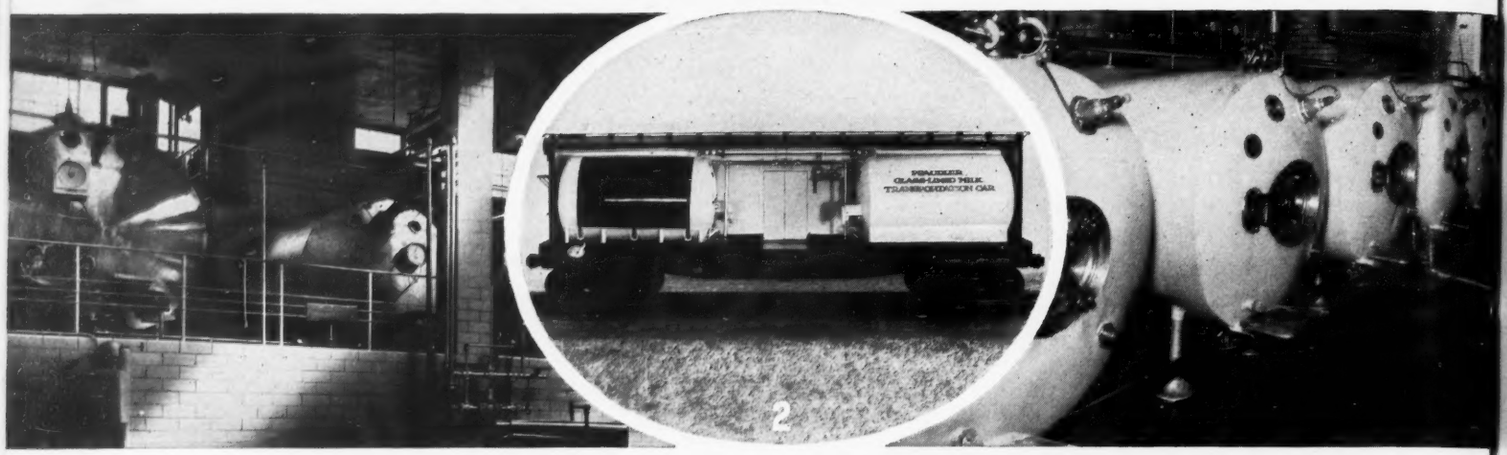

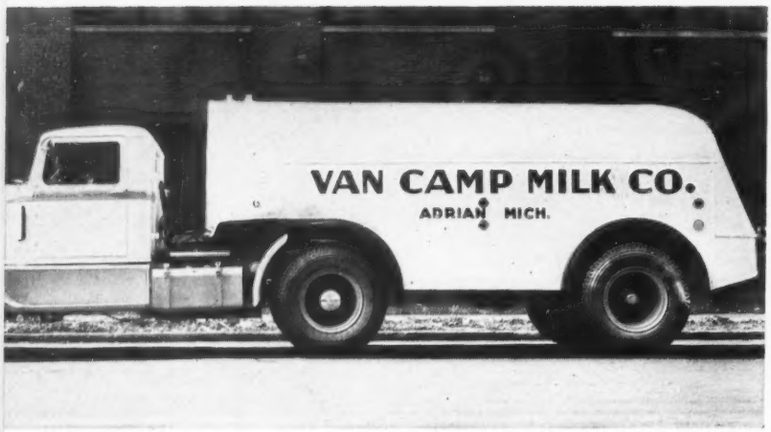

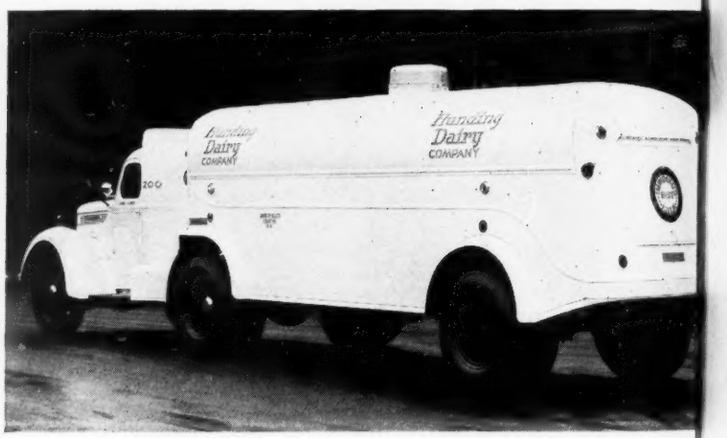

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"JUST WHAT WE NEEDED"

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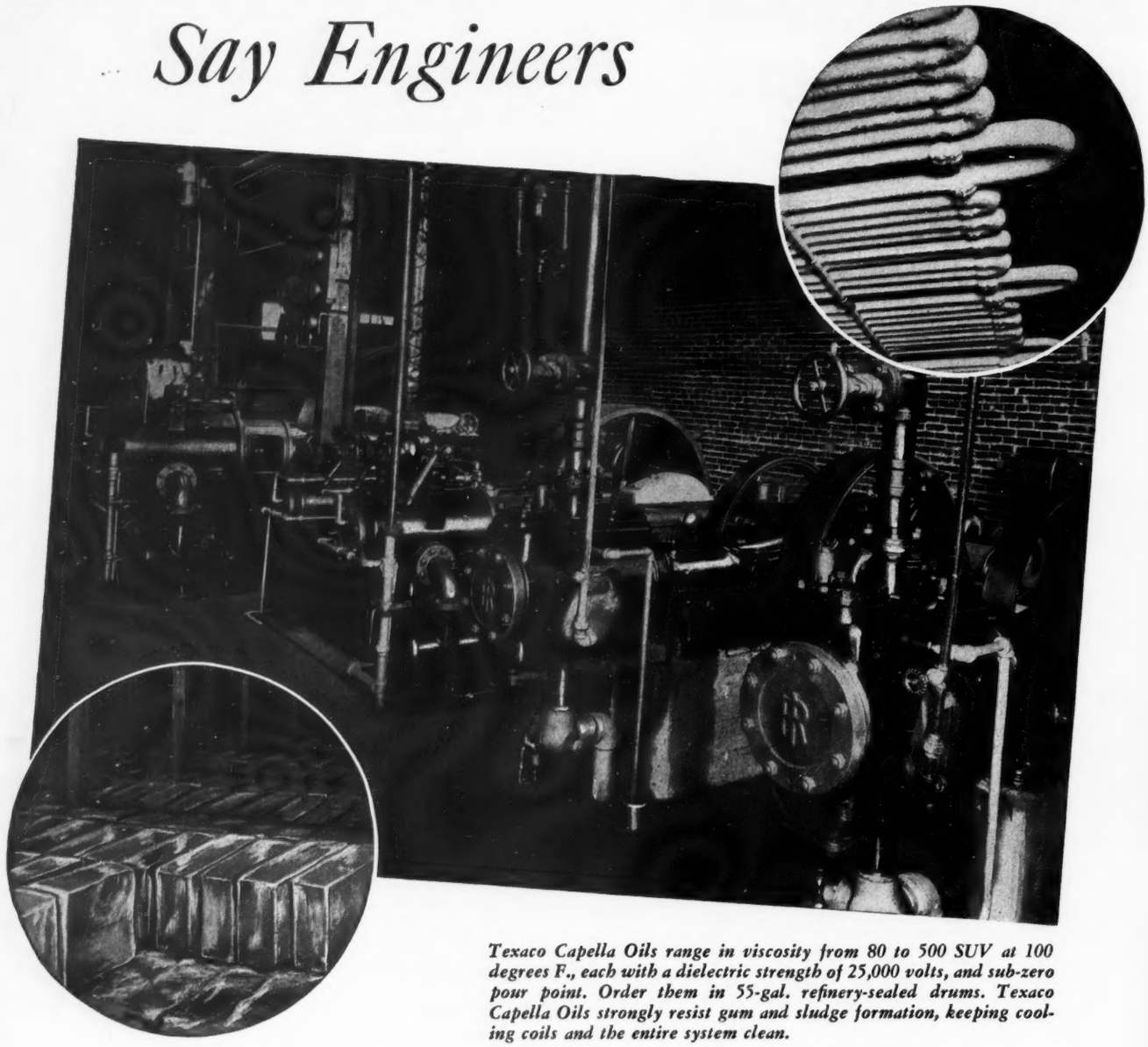

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FOOD INDUSTRIES

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Established 1928—McGraw-Hill Publishing Company, Inc.

Vol. 10, No. 3

Laurence V. Burton, Editor

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MARCH 1938

The Talk of the Industry

» ROYAL CANADIAN MOUNTED POLICE seized 418 lb. of butter on Jan. 21 in Montreal. Though it was being sold from house-to-house as "fresh creamery butter straight from the farm," it had nearly twice the legal limit of water content—27.3 per cent vs. 16 per cent.

Subsequent investigation by the Mounties is said to have revealed that the enterprising salesman mixed the butter with both coconut oil and water in the bath tub in his rooming house. While we are glad to know of the new market for small enameled tanks, we wonder what the other boarders thought about it—or the boardin' Missus.

It all goes to show that, no matter how humble a business may be, quality control is ever important.

» A FLOCK OF CONVENTIONS has prevented our getting around to the depression until just now. We had fully expected that this slight negligence would be overlooked, but somebody has been foolish enough to send us a big scrapbook full of newspaper clippings which purport to be the previews of 1938 made by Captains of Industry and business paper editors—yes, even this department's.

Most of the predictions were published between Dec. 10 and Jan. 5 and probably they were written at least ten days before publication. Headlines were rosy. "Business to go on a Spree," "Good Year Ahead," etcetera. And invariably, our own cautions prediction that the net profits of the whole food business would be about 75 per cent of 1937, was relegated to the last five lines of the lower right hand corner. O.K., but if the newspapers had omitted our guess altogether it would have suited us better.

No more dangerous discovery has ever been made than Mr. Roosevelt's of last March when he realized that by saying prices were too high, they would turn downward. Since then, the new trick has been worked with effectiveness, notably his January blast that prices must come down without reducing wages.

If he could learn to keep silent for a long time like Vice-President Garner did, when on his one-man strike, business would be able to adjust itself to current conditions, gather confidence, and go ahead. But that would be too much to expect of a Roosevelt.

There is no fundamental reason why business should not be better right now, other than that elusive thing called sentiment. And sentiment would be better and business would be better if Mr. Roosevelt would go on a fishing trip to the South Seas, and fish—not broadcast.

» THOSE WHO SMILED INDULGENTLY during the uproar in the "Little Business" Conference in Washington are now delighted that little business is more frank and outspoken than big business. And, of course, you cannot call little business dishonest—not according to official Washington's standards. In some respects the character of the earliest phases of the conference parallels the activities of a rough-and-tumble fighter when contrasted to an experienced heavy-weight champion.

The chap who compared New Deal policies to the flitting about of a canary bird and demanded that it

alight somewhere, put into words the thought of every business man.

But that is not enough for this country. A fixed bad policy is not much better than a succession of flitting bad policies even though it is possible to adapt ourselves to the bad policy.

» A GOOD BOSS always sticks up for his help, just as he would like to have them always stick up for him. But sometimes the boss does not know all that is going on. So when we read of J. Warren Madden's defense of the National Labor Relations Board from charges of incompetence and bias we were unable to repress an audible smile.

One can concede that the board is fairly competent, if having their own way is a mark of competency. Yet after bending the elbow with the board sometime ago we freely admit their bias. In fact, the Secretary of the board nearly frothed at the mouth at a man who pooh-poohed the idea that a 48-hour work week was excessive labor. Said the Secretary: "It is evident that you are another example of that blight on society—the self-made man."

The "self-made man"—another name for a fellow who gets somewhere by long hours, hard work and

using his head—is poison ivy and small pox to a biased zealot for social change. Your radical of today has no logical answer to the man who emerges from the mob by his own efforts and asserts that exactly the same opportunity is open to others.

Early in February two labor spokesmen called on this department ostensibly to seek information, though one suspects that they were merely two more in the long string of a curious type of callers—people who make a living by trying to hush up criticism of the New Deal. The only answer they could give to the self-made man was the complaint that he loves to work. Draw your own conclusion.

Kill This Tax

WHEN THE ADMINISTRATION DECIDED that Henry Ford needed to be taxed into submission to the New Deal's philosophy, a bill was introduced into the Congress to put a penalty tax on closely held or family corporations. This is the so-called "third basket" tax which is designed to sock the rich.

As a matter of fact, if enacted in anything like its earliest form, it will sock the food industries. The majority of the 13,000 odd corporations in the food manufacturing business are small corporations not listed on any security exchange. To avoid the outrageous penalty taxes, those in control will have to sell a substantial amount of their holdings. But, to whom, and how, and for what sum? And what will occur as a result?

Furthermore, it is hard to conceive of a more pitiful situation than a small corporation with a lot of very small stockholders who know almost nothing about the business, and whose stake in it is so small that it is probably better to lose it than to fight to keep the business going. To a banker, a worse credit risk could hardly be found.

And that isn't all. In one case of fairly recent history, a $75,000 food company had only two important men stockholders, the president and the general manager who was the former's son-in-law. The other stockholders were all women except one small retail grocer who lived 800 miles away. Then the G-M unexpectedly died while having a tooth extracted. The president had another and bigger business of his own that demanded all his time. —Times were hard, and the going was tough. What to do? He tried to sell the small concern at 25 cents on the dollar, but there were no buyers. Ultimately it was liquidated.

Another case was a food company of about $200,000 capital, held by one man and eight widows of his former associates. Then he died.

The number of such unhappy cases could be enlarged almost without end. It is one of the penalties of small corporate size that seem to be inevitable when time and death take their toll. The "third basket" tax would merely accelerate the normal changes. But to think that society would be better served or that employment would be increased by increasing the number of shareholders in small corporations is an absurdity that would be a joke if it were not a tragedy to the employees themselves. Yet that is the inevitable outcome of the "third basket" tax. The tax should be killed.

New Opportunities For Food Manufacturers

ORDINARILY FOOD INDUSTRIES has little to do with the science of nutrition, except where factory procedure may affect the nutritive quality of the foods undergoing process, or where the possibility of an enhanced nutritive value offers a sound reason for a change of processing methods. We still believe that the surest way to build repeat business is to produce a food that tastes so well that the consumer comes back for more for the sheer satisfaction of eating it. There is little future for a food that requires logical reasons as to why it should be consumed if it is lacking in appetite appeal.

Yet, despite our convictions, it is impossible to disregard certain new scientific discoveries in the field of mineral nutrition. A recent well informed caller in our offices has asserted that he believes mineral nutrition will soon occupy the center of the stage of public interest, comparable to the position today occupied

Hors d'Oeuvres

Shortly before the Little Men invaded Washington, Big Brother Colby Chester, head of General Foods Corp. and chairman of National Association of Manufacturers, advised business, labor and government to stop slinging mud. The small boys took his advice. They flung bricks.

There are six million people in the United States every day during winter who are unable to work, attend school or pursue other activities because they are rendered hors de combat by illness or injury. This condition, revealed by the National Health Survey, would seem to indicate that there is a real market for health foods —if you will pardon our unfeeling commercial attitude.

The Japanese get us coming and going in the salmon business, the Alaskan packers complain. First they take our fish. Then, exporting to England, they take our customer. But since the same people eat the fish, no one goes hungry. The Japanese, of course, could not stand seeing any one go hungry.

Down in Coffee County, Georgia, Miss Sue Stanford is stressing the use of peanut flour in cooking in her classes for club women. Sue's efforts to promote a native product for its high nutritive value undoubtedly are highly commendable. But the combined efforts of many Southern Sues is slowly but surely changing the food-fact picture of these United States.

California, the home of sunshine, flowers and fancy females, produces three-fourths of the 20,000,000 lb. of garlic consumed in the United States. Such are the vagaries of nature.

Section 8850 of the Oklahoma Pure Food and Drug Law says: "It shall be unlawful for any person to sell . . . any honey which has not been home-made by bees, unless same is labeled 'imitation' . . ." Here's one food industry that must remain in the home.

Indiana's state prison at Michigan City will increase the capacity and efficiency of its canning plant. The warden probably looks forward to putting up more and better yeggs.—You say it's a rotten yolk? Excuse it, please.

In the Andaman islands, the eating of a live rodent is said to be a test of manhood, and no man is permitted to marry until he has eaten one.—That's to see if he can take it.

A machine known as the "iron chink" is used in fisheries to perform the operation of gutting. Formerly, Chinamen were used for this work. Theirs were the only hands with the necessary skill, speed and endurance.

Quick freezing now holds the spotlight in the food industries. Which reminds us of an unusual application of it. In Boston, mothers' milk is collected by a charity organization, to be preserved by quick freezing for new-born infants without adequate supply of their natural food and whose lives depend upon their getting it. The lives of many future food consumers have been saved by this quick-frozen milk.

by vitamins. And subsequent incidents and publications tend to substantiate his prediction. One of the latter is "The Essentiality of Cobalt in Bovine Nutrition" by Neal and Ahmann (*Journal of Dairy Science,* 20, 741, 1937), in which it is shown that young animals require cobalt in order to live. The authors state that it is "improbable that a 1,000-lb. cow contains as much as 25-30 mgs. cobalt. A day's intake of cobalt in normal feeds is not over 1.0 to 2.0 mgs. . . ." The study reported here was made in Florida.

Back of this investigation lies the fact that there are certain areas all over the world where nutritional anemia occurs. Our immediate interest, however, lies in the fact that soil deficiencies are discovered only by such phenomena as the foregoing inability of animals to subsist on its vegetation.

One wonders how much of human ills and weaknesses have this origin in similar mineral deficiencies. After all, most of our mineral intake comes via foods that are raised on farms. And then there is the curious fact, reported a few years ago by Dr. Vaughn in the *Journal of Allergy,* that many of his patients are allergic only to a food like celery and citrus fruits which come from a definite locality and are not affected by the same foods from another part of the country.

Mineral nutrition is apparently a field where much is to be learned that will be of value to humanity and will be capable of just as great commercial exploitation as vitamins. It is suggested that those food companies which are equipped with scientific staffs will do well to follow mineral nutrition very closely.

While we have a profound dislike for all food faddists, whether quack or pseudo-scientific, it is not difficult to believe that many of the minor or obscure health problems of man may find their prevention in a better knowledge of nutrition. But when this knowledge shall have been gained, it will be the duty of the food manufacturer to make it effective and available to all. And it will be profitable to him.

Oddities of The Food Laws

SOME FUNNY THINGS are done legally. For instance, New Hampshire has just ruled that a California manufacturer of citrus juices must take out registration, get a license and pay a fee in order to sell his juice in that state because it is a beverage. This ruling is "applicable to all packaged liquids intended to be used in the manner of drink." It covers beer, tomato juice, carbonated beverages, medicinal waters, concentrated beverages and some more things.

"Are soups also a beverage?" our friend in California innocently inquired. Soups are not a beverage, says New Hampshire, because they are eaten at the table with a spoon. But bouillon cubes (*sic*) are a beverage while plain beef extract is not. (Gargle those, if you can.)

And we know G. Washington Coffee Co. will be delighted with this: G. Washington Coffee is not a beverage —not in New Hampshire. Neither is tea, coffee or cocoa.

Management's Responsibility in Research

ONE OF THE PATHETIC THINGS OF LIFE is the too frequent lack of understanding of the true function of research in industry. Never was the truth of this assertion borne out more forcefully than by the attitude of a recent caller at our offices. He asked for the names of three of the best research men available. When asked in what field of science or engineering he was seeking for qualified research men, he did not know. When asked what sort of things he wanted invented, he was a bit irritated and replied that he wanted research men—not inventors.

"But surely, you must have in mind something definite that you want discovered or invented. Research is only another name for invention. On your own say-so, you apparently want an inventor but you don't want anything invented."

"Well," he answered, "All I know is that a lot of our competitors are going in for research and seem to be more successful than we are. So I want a research man, too."

Then, it was explained to him, the only possible course would be the employment of a good research man, followed by a long period of patient waiting for the research man to familiarize himself with the details of the business until he could discover what was wrong with the business, the things that ought to be improved, the new methods, processes or machines that ought to be created in order to make the business more profitable. In other words, the research man was to be hired to do the sort of fundamental thinking that he, the president of the company, ought to be doing.

Was the president patient enough to bring in an outsider and wait one year, two years, maybe three years for the newcomer to make up for the president's shortcomings—the president's inability to discover that anything was wrong with the business?

Would he be patient enough to wait the necessary time to discover the problems needing solution and then wait still longer for the research man to find the solution, if indeed the problem was one capable of solution?

Was the president—obviously a very impatient man—one who was willing to sit down for a long succession of conferences to give the new research man a concentrated education?

The president was not—most decidedly NOT.

"Then, Mr. President, you and your company are not ready for research, and you cannot be recommended as an employer for any research man worthy of the name. The first step in industrial research must originate with the company. The executives of the company must be able to state its problems, decide what it wants invented or discovered. Or else they must be very patient while somebody else does it. What you want to do is go home and think hard about the things you ought to have, or that would be helpful to the business. Then come back and we'll find the right man for the jobs you want done." He left in a huff. Okay, okay. He who consults us does so at his own peril.

Frozen Foods Manufacturers Need Caution

A TREMENDOUS REVIVAL OF INTEREST in quick freezing and the whole frozen food business is apparent this year. Though the general interest in the subject is far greater today than it was in 1928-30, it is on a much saner and sounder basis. Today we know how to sell and distribute frozen foods, and they have a growing public acceptance—something which was not true eight years ago.

But, the frozen food business is in need of sound technical guidance. It also needs self-restraint. There is a tendency on the part of newcomers to overlook or neglect proper quality control. The very fact that the public accepts frozen foods is both a hazard and an obligation, for this public acceptance constitutes an invitation to produce for the enlarging market. That the market exists is self evident. And if satisfactory goods are produced the market will always be there. It takes no great amount of brains, however, to realize that unsatisfactory goods will destroy this acceptance not only for one brand of goods but for all frozen foods. Hence, it is important not to underestimate the importance of the accuracy of quality control.

Progress in PACKAGING Meat Products

PART I

Expensive faults have been found and eliminated

By F. D. CUMMINGS*

Director in Package Research, John Morrell & Co., Ottumwa, Iowa

▶ ***The cost of materials and supplies to prepare the products for the consumer is the second largest item of expense in the meat packing industry. So every effort has been made by the packers to reduce this cost. How the reduction in expense has been accomplished without sacrificing protection to the product is a story of practical value to***

All Food Manufacturers and Distributors

DIMINISHING EXPORT OUTLETS for packinghouse products and, in more recent years, a scarcity of livestock have caused packaging to become a dominating factor in the general merchandising plan of the industry. This stress revealed that many of the old methods of packaging were costly and inadequate. Some of the objectionable features were excess weight, lack of unity and lack of maximum protection to the product at minimum cost.

Package design must consider such factors as purpose, size, character, protection, name, text and decoration. However, the name, text and decoration should not be of much concern to the operating department.

Package requirements vary greatly, depending upon the nature of the product and conditions to which it might be subjected. To the average retailer, the package must deliver the product to his store in as fresh a condition as possible. To the housewife, when the product is placed in an immediate container, it is the ease of opening and emptying the contents that determines a successful package. Principal offenders are found to be square tins, narrow-necked bottles and the like. Dispensing packages must provide a way for the unused contents to be kept fresh, and they should not be so elaborate as to arouse the suspicion of the buyer that she is being penalized by high packaging costs.

The packaging of meat and provisions involves an unusually large assortment of kinds, sizes and shapes of packages. For instance, vegetable parchment and oiled and waxed manila papers are used for fresh meats; vegetable parchment, grease-proof papers and transparent cellulose for smoked and cooked meats; vegetable parchment or greaseproof liners for lard and shortening; cartons of all sizes, shapes and combination of board for canned meats, fresh, smoked and cooked meats; cellulose casings for fresh, smoked and cooked meats; glass jars varying from 2 oz. to 24 lb. net weight for dried beef, spreads, cooked meats in vinegar and the like; a multitude of tin containers for canned meats, lard, shortening and meat byproducts; shipping containers of solid wood, plywood, veneer, fiber and corrugated board. All of these come under the scrutiny of a well thought out packaging program.

In dealing with the subject of packaging, let us first consider the new and old methods of determining package standards. In many of the plants, especially during the early stages of packaging development, the ordering of package supplies was, more or less, a slipshod business.

TODAY, in most well organized companies, there has been instituted a department whose business it is to concentrate on package problems and to determine package specifications to meet plant requirements. This department may be known as the "standards department," "package and supply department" or by some other name. But whatever it may be called, it functions very much the same. It is the duty of this department to coordinate the efforts of the sales, advertising, purchasing and operating departments and work out specifications which will, in so far as possible, meet the wishes of all concerned.

With some of the old methods, price was the determining factor in making purchases. Some advertising departments, in working with designers, created freakish ideas of package design which worked hardships on the operating department. Operating departments wrote some specifications which were more costly than necessary, but avoided complaints. Sales departments campaigned without giving ample time to provide the necessary supplies, or caused storekeepers to carry excessive stocks of supplies for their protection.

Today we write package specifications that are good enough to deliver the contents under normal conditions to their ultimate destination with a minimum loss or damage.

In determining how good the package should be, consideration must be given to the characteristics, degrees of fragility, effects of heat, cold or moisture, value of the particular commodity involved, the length of the journey, the number of times it will be shipped, the kind of transportation services, the handlings through which it will pass and numerous other factors.

A specification is a word photograph of the material you wish to purchase. Like a photograph, it must be in focus. It must be clear—not only in general outline, but each detail must be made to stand out apart from the rest. In short, it must be under-

* From a paper presented at the annual convention of Institute of American Meat Packers, held in Chicago, Oct. 22–26, 1937.

standable and must clearly convey your meaning. The effect that a specification is intended to produce on a manufacturer, a supplier or a contractor is to make clear to him just what you want.

If your specification is clear in all its details, it is a good one; it is fair to all bidders. But if it is not clear in every detail, it is decidedly unfair, for in his interpretation each bidder may form a different picture of what is wanted.

Specifications as commonly understood must of necessity be statements of minimum acceptable requirements. When competition becomes keen this tends toward the delivery, under contracts, of material which will be no better than the very lowest quality acceptable under the specifications.

An increasing tendency to base specifications upon performance in service, rather than upon the composition of materials of manufacture, is a noteworthy development of the present time. What the meat packer is primarily interested in is service, rather than the materials and the dimensions necessary to render that service; whereas, it is to the interest of the manufacturer to select such materials and give them such shape and size as to perform the required service at a minimum production cost.

To remain serviceable, packaging specifications must always be in a state of revision as production methods improve, as the quality of raw materials for a given product changes and as new limitations are imposed on the use of a product. They should be revised at least once a year or oftener. The important thing is that the specifications should actually fill the need; no more, no less. To set requirements at a higher level than necessary will add to the cost with no return on the added investment.

After standards have been determined, it has been found advisable to furnish the information to all interested persons in the organization. A sufficient number of copies should be sent to the purchasing department, so that it may in turn send copies to the firms with whom it wishes to do business. This method simplifies the ordering of supplies on a competitive basis. And once the suppliers have acknowledged receipt of the specifications, the responsibility of furnishing package materials to meet plant requirements then rests with the seller.

When we consider that the meat packing industry today assumes the position of a finished processor of meats and is no longer satisfied to slaughter and sell principally fresh and cured meats on a possible profit of a fraction of a cent on the dollar of sales, *when we consider that the cost of materials and supplies to prepare products for the ultimate consumer is the second largest item of cost in the industry,* it is only natural that every effort should be made to minimize packaging costs. And what might appear to be trivial savings in changing package specifications will mount to thousands of dollars in annual economy.

With these remarks let us now consider the various materials used for the wrapping and packaging of packinghouse products, which are familiar to operating men in the meat industry.

Let us first consider paper for, after all, paper—including wrappers, labels, cartons and shipping containers—constitutes one of the major items of packaging cost.

The most important source of paper-making material today is wood pulp, which is prepared for use in paper making in four ways. The products are known technically as "sulphite pulp," "soda pulp," "sulphate pulp" or "ground wood pulp." In addition to rag and wood pulp, a wide variety of other substances, such as straw, jute and so forth, are used in the manufacture of paper which requires special properties.

The quality of any paper is due primarily to the strength and cohesion of its constituent fibers. In evaluating papers, the foregoing, as well as the surface characteristics of paper, are important factors upon which tests are based. Paper consists essentially of an enormous number of fine fibers matted together and interwoven in such manner that a continuous surface is presented. The finish of paper, which is essentially a surface characteristic, is due primarily to the character of the inert materials used for "loading" it, which are known as fillers. Fillers, as the term is used in the paper industry, are finely divided substances added to the paper to fill the spaces between the fibers composing the sheet.

F. D. CUMMINGS

The finish of paper is also dependent upon the addition of sizing materials, which are added mainly to render the naturally porous or absorbent surface more nonabsorbent. Various degrees of sizing are required for different papers. The degrees of sizing and nature of agent used depend upon the purpose for which the paper is ordered.

As regards the physical properties of paper, bursting strength is an important test; although it is not regarded as important as heretofore. It is, however, a valuable test and is especially useful for comparing competitive papers. Papers should be checked to maintain the correct basic weight; paperboard in cartons and shipping containers should be calipered to maintain standards.

One of the most important factors in packinghouse operations is the proper use of wrapping papers. Yet, observations that have been made in the industry have revealed that many packers are wasting money and damaging both quality and appearance of product through the incorrect use of various papers.

Vegetable parchment continues to be a favorite with the operating man for the wrapping of fresh, cooked and smoked meats, although other grades of paper are being substituted for it for many purposes in an effort to lower wrapping costs. For the wrapping of fresh meats, two kinds of oiled papers are also in general use in the meat packing industry—packers' oiled manila and white oiled loin paper. The former has been used by packers as a meat wrapper for at least 35 years. It weighs 75 to 80 lb. to the ream, is semi-absorbent and is used to wrap meats containing considerable moisture, including pork loins, butts and shoulders. Oiled loin paper is used for the same purposes by some packers, and basic weights range from 35 to 53 lb. to the ream. Claims for the latter grade are that it is pure white and has a porous though fully protective texture, which permits movement of air and allows the loins to "breathe." Manila papers with waxed coating have given very satisfactory results.

The various grades of paper for the wrapping of fresh meats have

their advantages and disadvantages, and it is more or less a problem for each packer to decide what he wants his paper to do for him.

Under this heading of fresh meats, one presumes mention should be made of freezer wraps, as there is understood to be a wide difference of opinion. Weights of paper used vary from a 35-lb. to a 65-lb. basis in the waxed-kraft division; also, moisture-proof transparent cellulose has been proven effective in retarding freezer burn. In plants operating to a large extent on a fresh-meat basis rather than as a finished processor, wrapping of meats to retard freezer burn is an important factor. However, the kind, weight and finish of the paper to be used depends to some extent on the conditions under which you are operating. It is recommended that you consider all papers suggested for this purpose and make thorough plant tests to determine the kind of paper that will give best results consistent with reasonable wrapping costs.

In the lard department there are only two papers to be considered—vegetable parchment and greaseproof paper. The former continues to be a favorite because of its higher grease-resistant qualities, uniformity and performance in high-speed forming, lining, filling and closing equipment. However, much substitution of greaseproof paper for lard liners has been made possible by the improved methods of manufacturing greaseproof papers of various weights. Today we have greaseproof papers which compare very favorably with vegetable parchment in appearance, grease-resisting qualities and performance, while a few years ago greaseproof papers were hard, dark in color and lacking in uniformity and performance.

However, users of greaseproof paper for lining cartons on high-speed machinery will find it to their advantage to carefully check the performance of greaseproof lard liners purchased on a competitive basis. Rapid advancement is being made in the development of greaseproof paper, but there are those that find it difficult to keep up with the trend.

Much that has been said about greaseproof paper for lard liners may be said about greaseproof wrappers for smoked and cooked meats, although standards need not be so rigid in view of the fact that the paper is not handled on high-speed lines and, as a general practice, does not come directly in contact with the product.

In the field of liners for cans in which meats are processed—lining of ham cookers and the like—there appears to be no satisfactory substitute for the vegetable parchment, and it is only a problem of determining the weight of paper best suited for your requirements. Disintegration which would occur during the processing makes the use of cheaper grades of paper impractical.

The use of transparent cellulose is being extended in the industry. The grades of transparent cellulose generally used are standard, moisture-proof and heat-sealing. Transparent cellulose found its way into the industry through the sliced-bacon wrap, but it has been extended to the wrapping of smoked and cooked meats, cartons, seasonal wraps, decorative labels for beef and lambs and, more recently, wraps for veal.

The right paper, used in the right way and in the right place, will always do much to preserve the "bloom" and the quality of meat products. Each paper has its own merits, and most papers will do the job for which they are intended at the lowest price consistent with good practice. It is the duty of your package man to gather all of the facts, consult interested parties in the organization and write the specifications.

UNDER THE HEADING of paper we should consider labels. The rapid advancement made by the packers in the field of canning meats has caused his label requirements to become one of the major items of packaging costs. Labels for the identification of products are possibly one of the greatest sources of trouble to the operating man if not of the correct specifications. Here again, volume demands that unit costs be consistent with good business practice. Duplex papers are being used freely in the place of coated papers with satisfactory results. The basic weight of label paper is usually 50 lb. to 60 lb.

Careful consideration must be given to the selection of label paper for proper performance in high-speed labeling machines. The paper must be of the right degree of porosity to absorb enough, but not too much, adhesive. Its porosity will also affect the drying, determining whether or not it will dry without wrinkles. Softness aids greatly in applying the labels to the cans. Hard papers have no place in the operation of high-speed labeling machines.

Direction of the grain is controversial, and performance tests will determine your preference. Your specifications should indicate the direction of the grain of the paper of labels for high-speed labeling machines. The direction of the grain of the paper for hand labeling is not so important and is sometimes left optional with the label manufacturer.

However, paper is not the only factor to be considered in the manufacture of labels; correct application of inks is very important if one is to avoid making the labels hard and avoid sticking in the packs, either of which will be a source of grief.

Purchasing agents may prevent a costly and unpleasant experience by working in close harmony with their package man when considering a change in the source of label supply. Any noticeable change in the results obtained with labels should be immediately reported to the purchasing department so that the label manufacturer may check his production.

ADHESIVES have a very definite part in a well prepared package. I believe that many package failures may be attributed to the improper use of adhesives. In the highly competitive field of manufacturing adhesives, great claims are made, and while the adhesives may have been proven in the laboratory for a definite purpose, it is the packaging man's problem to determine the kind of adhesives best suited to his plant.

Pickup gums and lap-end pastes for high-speed labeling machines must be carefully selected to maintain maximum speeds with minimum waste. Pickup gums may be obtained for cans of any temperature, but when operating conditions do not provide uniform temperatures for cans for labeling, then the labeling of cans becomes a difficult operation.

Adhesives for hand labeling of cans packed with low-processed meats presents a different problem; one of obobtaining an adhesive which will work freely in electric-driven label pasters, will provide ease in applying the labels to the cans and in rubbing the labels free of wrinkles, will dry without crystallization and will withstand the "sweating" to which the cans are subjected, due to varying temperatures and humidities.

The old adage, "If a little will do good, a little more will do better," does not hold true in the application of adhesives. Entirely apart from the economy standpoint, the thinnest film of glue that will do the work will almost invariably produce the most efficient results.

Part II of this article will appear in an early issue. It will continue the discussion of packaging materials and will cover, among other things, the selection of the right shipping containers. Great savings have resulted from revised specifications for shipping containers.—THE EDITORS.

TREATING Packaging Materials

Improves Keeping Quality of Food Products

By
FREDUS N. PETERS
Director of Research, The Quaker Oats Co.
and
SIDNEY MUSHER
President, Musher Foundation, Inc.

1. The interior surface of the cardboard used in this carton for whole wheat biscuit is treated with Avenix to prevent the development of "board" odors and oxidized flavors in the product.

2. This carton used for print butter by The State College Creamery, Pennsylvania, has been treated with Avenex to improve the keeping quality of the butter.

3. Avenized liners are used in paper coffee bags to keep the coffee in good condition for a longer period. Note the "Avenized" seal on the bag bottom.

THE PROBLEM OF RANCIDITY and oxidative deterioration of the fat containing foods is a serious one. The idea of treating packaging materials with edible protective substances in order to retard this deterioration in packaged foods is a recent concept. Under patents of Musher Foundation, Inc., and with The Quaker Oats Company as licensee, the Avenizing process as applied to parchment, greaseproof, and glassine papers and cardboard materials was developed.

Under this process, Avenex, a specially prepared oat flour, is applied to the paper or board as a sizing material, the application being simple and direct. Approximately 2 per cent to 3 per cent by weight of the Avenex is normally applied to paper, and 0.75 per cent to 2 per cent to cardboard. There is no change in the normal properties or appearance of the finished paper or board, the Avenex not being discernible.

That Avenex is markedly effective in inhibiting rancidity when applied directly in the manufacture of fat containing foodstuffs is already well established.[1,2] Of particular value, however, is this work because of the fact that oxidation and rancidity usually begin at the surface of packaged foods where contact with the paper or cardboard packaging material is the greatest. Consequently this point of contact is utilized for the protective effect it exerts when treated with an edible harmless antioxidant such as Avenex.

In the case of butter, for example, vegetable parchment is the commonly used packaging material. Under fellowships established by Musher Foundation, Inc., at The Pennsylvania State College, University of Illinois, and Oklahoma A. & M. College, work was undertaken to study the value of Avenized parchment when used in the wrapping of butter. These studies were continued over a period of a year, during which time all grades of butter were examined. It was shown that this parchment is effective in retarding the development of tallowiness and oxidative deterioration in butter. As a result of the researches conducted at The Pennsylvania State College, Avenized parchment has been used commercially by The State College Creamery for the past sixteen months for their entire butter distribution in central Pennsylvania.

The complete results of these studies were reported recently.[3,4,5] It was shown in this work that the maximum

(*Turn to page 175*)

▶ ***Oxidation and the development of rancidity in fat-containing foods, between the time of processing and the time of consumption, are problems faced by many manufacturers. Treatment of the packaging material with an antioxygen is one way to retard this trouble. This article discusses some of the results obtained by this method, which can be used by***

Bakers
Butter Makers
Cheese Makers
Ice Cream Producers
Meat Packers
Other Producers of Fatty Foods

TESTING Packaging Materials *for Permeability to Moisture*

How it should be done. Also, table giving permeability to water vapor of various packaging materials.

By FREDERICK T. CARSON[1]

National Bureau of Standards, U.S. Department of Commerce, Washington, D.C.

THE VARIOUS TYPES of methods that have been used to measure the permeability to water vapor of many different materials are described briefly. The various testing conditions used, such as moisture gradient, pressure, temperature, area, test period and air movement, are tabulated for comparison. In the interest of more uniform testing practice, a number of important conclusions and recommendations are given which seem to represent the consensus of opinion based on experimental data as expressed in more than 30 published reports.

A previous article, "Passage of Moisture Through Packaging Materials," (FOOD INDUSTRIES, January, 1938, page 14), considered the question of how moisture gets through some materials, especially some that are impervious to air, and discussed a number of factors that affect the testing of the permeability of wrapping materials to moisture. In this second article, various testing methods that have been used are described briefly, and test data are given that have been reported for various materials from a number of sources.

Data from 28 published reports are given in the two accompanying tables.[2] The methods used fall into five general types, designated by letters in Table I.

In method A, the test specimen is fastened over the mouth of a dish or cell (such as a crystallizing dish) containing water, or an aqueous solution that will produce a high humidity. Loss of moisture through the specimen to a drier atmosphere on the outside is determined by weighing the cell at intervals.

Method B is similar to method A except that a desiccant (drying agent) is contained in the cell and a moist atmosphere is maintained outside of it. The cell gains weight according to the amount of moisture that passes through the test specimen.

In method C, the test specimen is mounted so that it separates two streams of air flowing over its two faces, one air stream being moist and the other dry. Moisture passing through the specimen, which is lost from the moist stream and gained by the dry stream, is determined by weight differences or by other suitable means.

In method D, the specimen is made a partition to separate a vacuum chamber into two parts, into one of which enough water is admitted to supply saturated water vapor during the test. The permeability is measured, either by the rate at which a mercury manometer shows the vapor pressure to increase in the drier side, or by the rate of increase in the weight of a desiccant suspended from a quartz-fiber spring balance in the drier chamber.

In method E, the specimen is a partition separating saturated water vapor from a space that is continuously evacuated. The permeability is determined by the rate at which water vapor flows through a flowmeter in the evacuated space, the flowmeter consisting of a flow tube of given dimensions having an ionization gage at each end.

Table I shows that a considerable variety of testing conditions have been used by various workers. For example, the test period varied from 2 to 2,000 hours; the temperature, from —14 to 45 deg. C. (7 to 113 deg. F.); the difference in vapor pressure, from 0 to 72 mm. of mercury; the area, from 0.15 to 323 sq. cm. (1/50 to 50 sq. in.). The rate and manner of ventilating the specimen also varied greatly. The results have been reported in about twenty different units.

Table II contains typical test results of the permeability to water vapor of many kinds of materials in sheet form. These values, originally reported in many different units, have been calculated to a common unit for ready comparison. The range of values in this table, though large, is but a small fraction (less than a millionth part) of that which has been reported for the permeability of similar materials to air. The least permeable materials may be 10 to 100 times more permeable to water vapor than to

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▶ ***This article supplements "Passage of Moisture Through Packaging Materials," published in the January issue of FOOD INDUSTRIES, to complete the discussion of factors affecting the penetration of moisture through food wrappings. The first article covered ten factors influencing the loss or gain of moisture in packaged foods, and this one tells how to test materials for moisture permeability and gives the moisture permeabilities of various materials. It is of particular interest to processors of***

Bakery Products
Dried Fruits and Vegetables
Confectionery
Grain Products
Macaroni and Noodles
Meat Products
Nut Products
Potato Chips
Powdered Foods
Tapioca
Other Packaged Foods

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[1] Publication approved by the director of the National Bureau of Standards of the U.S. Department of Commerce.

[2] The two tables are reproduced from National Bureau of Standards Miscellaneous Publication M127, to which reference was made in the first article.

Table I.—Methods and Testing Conditions Used by Various Investigators in Measuring the Permeability of Membranes to Water Vapor.

Method [1]	Moisture gradient [2]	Over-all vapor pressure difference (mm. Hg.)	Temperature (deg. C.)	Total pressure difference (mm. Hg.)	Area (cm.²)	Test period (hr.)	Nature of edge seal [3]	Forced circulation [4]	After steady state	Unit used in report
A	W-A-S-50h	9.3	21	0	45.6	16	C only	Rapid	No	g./100 in.²/24 hr.
A	W-A-S-50h	9.3	21	0	32	16	C, rubber gasket	Rapid	Yes	g./m.²/24 hr.
A	W-A-S-Warm air	35 (?)	37	0	34	.....	" Cemented "	Mod.	Yes	g./hr./m.²
A	W-A-S-A-$CaCl_2$	50.6	38	0	.....	24	" Sealed tightly "	Mod.	No	g./m.²/24 hr.
A	W-A-S-lh	53	40	0	36	24	Beeswax	Mod.	No	g./100m.²/hr.
C	High h-S-Low h	6–17	15–21	0	16.3	97	C, rubber solution	Slight	.....	g./hr.
B	W-A-S-A-P_2O_5	23.8	25	0	50.3	.....	Rubber cement	None	No	liter/m.²/24 hr./atm.
B	95h-S-A-Al_2O_3	25	27	0	72 (?)	.....	" Sealed "	Mod.	.....	hr.-cm.²/mg.
A	W-A-S-A-$CaCl_2$	32	30	0	36	24	" Picein "	None	No	mg./3 hr.
A	W-A-S-63h	37	38; 21[5]	0	65.5	4	" Seccotine "	None	Yes	g./sec./1,000 cm.²
A	W-A-S-A-$CaCl_2$	23.8	25	0	213	4	" Sealed "	Mod.	Yes	g.in.²/24 hr
A	W-A-S-A-Oh	23.8	25	0	.....	.....	C, wax, Hg., petrolatum	None	.....	g./cm. cube/hr./mm. Hg.
B	95h-S-A-Al_2O_3	25	27	0	72 (?)	.....	Wax	Mod.	.....	mg./hr./cm.²
A	W-A-S-A-H_2SO_4	49.2	38	0	.....	.....	" Sealed "	Mod.	No	mg./m.²/hr.
A	W-A-S-65h	6–14	21–38	0	25.5	400	Beeswax-rosin	Mod.	Yes	g./hr./m.²/mm. Hg.
A	W-A-S-5Oh	9.3	21	0	323	163	C, rubber gasket	Rapid	No	g./24 hr./100 in.²
A	W-A-S-A-H_2SO4	1–55	40	0	7.1	.....	Tinfoil, rubber	None	Yes	g./sec./cm.²
A	W-A-S-65h	37	38; 21[5]	0	75	.....	Rubber cement	None	Yes	mg./sec./1,000 cm.²
D	W-V-S-V-P_2O_5	23.8	25	23.8	5	700	C, mercury	None	Yes	mg./hr./cm.²
A	W-A-S-65h	6.1	20	0	200	.....	C, rubber gasket	Rapid	No	g./dm.²/hr.
A	W-A-S-A-H_2SO_4	3–32	30	0	7.5	2,000	Shellac, cerate resin	None	Yes	g./in.²/24 hr.
A	W-A-S-A-Oh	6–24	21–25	0	12.9	900	C, gasket, wax	None	Yes	g./hr./cm./mm. Hg.
C	100h-S-A-$CaCl_2$	31.9	30	5	38.7	2	C, petrolatum	Slight	No	g.
A	W-A-S-50h	9.3	−14, 21	0	42	120	Beeswax	Mod.	Yes	g./m.²/24 hr.
E	100h-S-V-Oh	17.5	20	760	0.15	.....	.....	Slight	.....	g./cm.²/sec.
B	W-A-S-A-H_2SO_4	0–72	5–45	0	1.27	168	C, cork gasket	None	Yes	mg./24 hr.
B	W-S-A-$CaCl_2$	55.4	40	0	28	24	Beeswax-rosin	None	No	hr.–cm.²/mg.
B	95h-S-A-Al_2O_3	25.4	27	0	72	48	" Special wax "	Mod.	.....	hr.–cm.²/mg.

[1] Methods described in text.
[2] W = water surface, A = air space, V = evacuated space, S = specimen, h = per cent relative humidity.
[3] C = clamping ring.
[4] Circulation of air in contact with one face of specimen: Mod. = moderate, Rapid = 1 to 3 m./sec.
[5] 38 deg. on one face, 21 deg. on the other.

air, while very permeable materials, such as some textile fabrics, may be as much as a million times more permeable to air than to water vapor.

One may be somewhat astonished to find the permeability to water vapor of a material like regenerated cellulose (plain cellophane, for example), the structure of which is so compact that the air permeability is scarcely measurable, to be (according to Table II) about the same as that for fairly open materials such as leather, textile fabrics and ordinary paper that may be thousands or even millions of times more permeable to air. The values reported for the rate of loss of moisture through copper gauze, or even from an open cell, are no greater (with one exception) than the maximum value reported for the rate of passage of moisture through ordinary regenerated cellulose.

Table II.—Permeability to Water Vapor of Various Materials Reported in the Literature.

Water vapor permeability in g/24 hr/m²/mmHg

Regenerated cellulose	Moisture-Proofed regenerated cellulose	Paper	Waxed paper	Other moisture-proofed papers	Vegetable parchment	Glassine	Waxed glassine	Moisture-proofed fibreboard	Asphalt
38	0.06	73	0.04	0.08	25	35	0.34	0.2	1.1
39	0.1	74	0.24	8.0	70	48	7.6	0.2	.....
67	0.2	80	0.25	40	.....	56	.....	2.0	.....
92	0.2	125	1.0	.....	.....	65	.....	.....	.....
115	0.2	250	1.5	.....	.....	.....	.....	.....	.....
225	0.4	.....	1.6	.....	.....	.....	.....	.....	.....
360	0.6	.....	4.4	.....	.....	.....	.....	.....	.....
.....	0.7	.....	14	.....	.....	.....	.....	.....	.....
.....	1.0	.....	17	.....	.....	.....	.....	.....	.....
.....	1.6	.....	18	.....	.....	.....	.....	.....	.....
.....	.....	.....	120	.....	.....	.....	.....	.....	.....

Wax	Cellulose acetate	Cellulose nitrate	Cellulose ethers	Protective films[1]	Rubber	Leather	Textile fabrics	Copper gauze	Open cell
0.06	0.04	1.4	10	0.19	0.04	1	75	120	218
.....	1.1	6	20	0.21	0.25	5	100	.....	251
.....	2	15	42	0.3	0.8	100	105	.....	336
.....	22	.....	.....	0.7	1.4	.....	115	.....	1,327
.....	44	.....	.....	5.9	3.9	.....	126	.....	.....
.....	68	.....	.....	8	6.5	.....	130	.....	.....
.....	150	.....	.....	15	9.6	.....	.....	.....	.....
.....	.....	.....	.....	26	.....	.....	.....	.....	.....

[1] Includes paints, varnishes and aircraft finishes.

Affixing a test specimen to a dish

It is evident from these observations that there is no definite relation between the permeability to water vapor and the permeability to air, and that the manner in which moisture gets through wrapping materials and other membranes must be quite different from the manner in which air passes through—a fact that was brought out in the previous article. It is interesting and significant that the permeability of wrapping materials to water vapor varies over as wide a range as that of all other materials reported. In fact, Table II shows that one variety alone, waxed paper, varies in permeability to moisture over practically this whole range. It is not sufficient, therefore, to specify kinds of material for purposes where permeability to water vapor is significant; but it is necessary to test them to be sure of obtaining suitable protection.

An analysis of the data and conclusions in more than 30 published re-

ports on the permeability of various materials to water vapor seems to justify the following conclusions and recommendations that are applicable to the testing of wrapping materials:

In any method, it is of the utmost importance that the specimen be secured to the cell in such a manner that there can be no leakage around or through the edges. It is customary to seal the edges with wax or other suitable sealing compound.

The area exposed for testing, when the edges are sealed with wax, is usually ill defined, but it can be well defined by the use of a suitable templet to limit the flow of the wax.

It is desirable to test a fairly large area of the material, because a large area affords better sampling and because it speeds up a test that ordinarily is slow at best.

Water in the liquid form should not be applied directly to wrapping material in testing it for permeability to water vapor, although this may be proper in testing some other materials. Water vapor of a suitable degree of saturation must rather be supplied continuously to one face of the material, while a drier condition is maintained on the other face.

The total atmospheric pressure should be the same on both faces of the specimen to prevent distorting the material or breaking the seal.

For the purposes of a consumer standard, it is not necessary to know or to take into account the relation between the thickness and the permeability of wrapping materials, although this relation may be of considerable importance in other situations.

Close control of temperature is necessary because of the important effect that a change in temperature has on the vapor pressure when definite relative humidities are maintained on the two faces of the test specimen.

If one face of the material tested is in contact with a very high relative humidity, the rate at which moisture passes through is not, in general, proportional to the difference in vapor pressure. If, however neither face is subjected to a relative humidity greater than about 70 or 80 per cent, it seems to be permissible in most instances to calculate (by simple proportion) the rate of transpiration for a unit difference in vapor pressure, provided of course the difference in vapor pressure across the specimen itself is known.

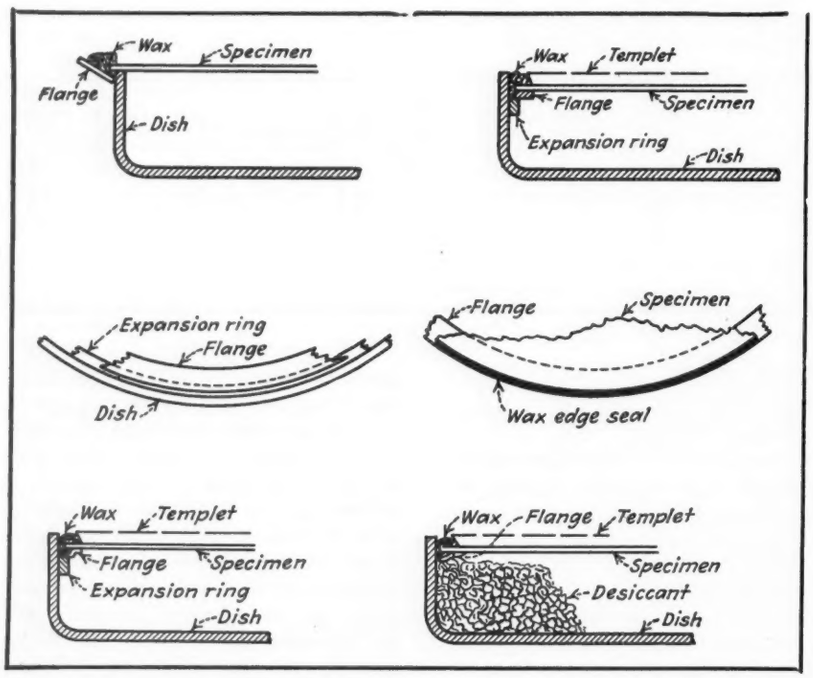
The amount of moisture passing through the material is proportional to the area exposed, and also to the time of exposure provided the data have been obtained after the steady state of transpiration has been attained.

The most popular type of testing method has been the simple one that makes use of a dish or cell, the mouth of which is closed with a piece of the material to be tested (methods A and B). In most instances, crystallizing dishes or other common laboratory equipment have been used. The change in weight with time, while a constant difference in vapor pressure is maintained across the test specimen, measures the rate at which moisture passes through. In methods of this type, the cell confines a layer of still air lying between the specimen and a humidifying agent or a drying agent within the cell. The thickness of this layer of air should be as small as possible. The air in contact with the outer face of the specimen should be kept in motion. Without these provisions, it may not be possible to know with any degree of accuracy the difference in vapor pressure across the material tested.

Each of the types of methods which have been described seems to have some special merit. The reason that methods A and B have been used by a majority of workers is doubtless the comparative simplicity in apparatus and procedure, notwithstanding some of the uncertainties that methods of this type involve. Some of these uncertainties could probably be minimized, however, by the use of an efficient granular desiccant in the cell and a relative humidity of 65 per cent on the outer face of the specimen. This arrangement would have the advantages that (*a*) the desiccant can safely be brought close enough to the specimen to practically eliminate the still-air space; and (*b*) a relative humidity of 65 per cent is already standard and widely available in the testing of paper and textiles, and is not much below the maximum value that could be used without getting into the region of high humidities where the rate of transpiration of moisture is not proportional to the difference in vapor pressure.

There is urgent need of a standard method of testing wrapping materials to determine their worth as barriers to the passage of moisture. Various groups seem especially desirous of having a generally accepted method, reasonably simple in nature, one that is capable of determining the relative value of different materials, or of different products of the same type. A standardization of this kind is one of the projects of the Paper Testing Committee of the Pulp and Paper Industry. Under its auspices, a symposium on the subject of the permeability of membranes to water vapor was held at the association's 1937 annual meeting.[3] As the result of the interchange of ideas at that time and subsequently, a tentative standard method (a modification of method B) has been worked out. The method incorporates the essential elements discussed in the last paragraph of the

(*Turn to page 170*)



Some methods of fastening a membrane to a dish with wax and supporting flanges, making use of a templet to define the area exposed.

[3] Technical Association Papers, Series XX, No. 1, p. 90 (June, 1937).

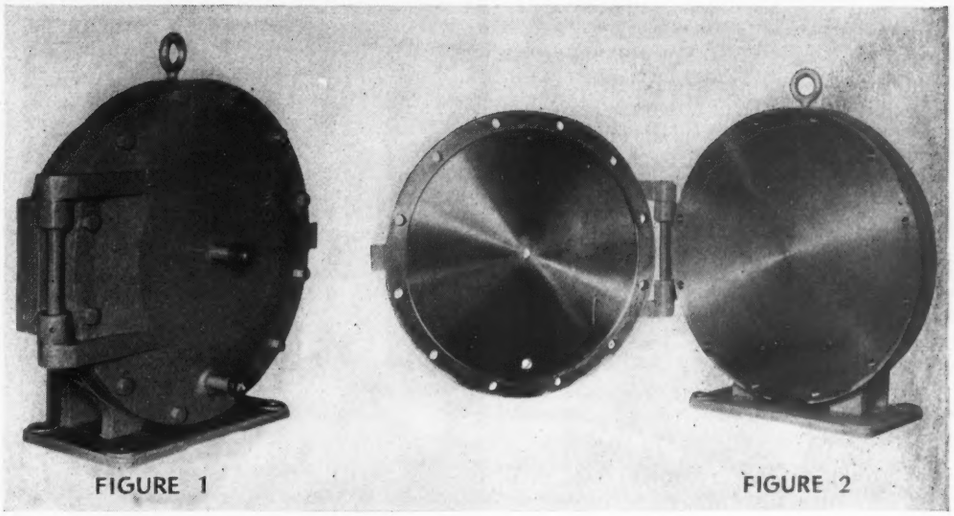


FIGURE 1

FIGURE 2

Fig. 1. This type of sonic oscillator is now in commercial use for treating milk and ice cream mixes. The heavy cover is in the closed or operating position in this picture.

Fig. 2. The same oscillator as in Fig 1, with cover opened for cleaning. An important feature is the ease of sanitation, since only two smooth, easily accessible surfaces are exposed to the treated fluids. This patricular device operates at 360 cycles per second and is capable of handling about 250 gal. per hour in continuous flow.

SOUND WAVES . . .

A New Tool For Food Manufacturers

"Sonic cavitation" is now used for homogenizing milk and ice cream mix. Can also be used for churning, emulsifying and dispersing operations, and for destroying bacteria.

By LESLIE A. CHAMBERS

Johnson Foundation for Medical Physics
University of Pennsylvania

INTENSE SOUNDS, regarded as annoying but necessary byproducts of modern machinery, may soon take a place of importance as useful tools of industry. It should not be surprising to find that sound waves can be made to serve purposes apart from communication. Sounds consist of a series of plane compression waves in an elastic medium and so may be regarded as a means of energy transfer from point to point. The wave should, therefore, by suitable control become the means by which mechanical energy is carried to points where it may be utilized, the wave playing a role analogous to that of the feed line to a hydraulic turbine or the conductor along which electrical energy reaches the windings of a motor.

When a sound wave is propagated through a fluid medium, the degree of rarefaction between compression peaks will depend directly upon the intensity of the wave or, in other words, upon the rate at which mechanical energy is being transferred. Now if the intensity be increased beyond a point which is critical for the particular medium under given conditions of temperature and pressure, the pressure in the rarefied zones will fall below the vapor pressure of the liquid and a cavity will be formed. As the pressure condition responsible for the cavitation passes beyond the region, the cavity collapses at once and exerts a tremendous force on a very small volume of the liquid, probably only a few molecules, or on any adjacent surface.

When disintegrative or synthetic processes occur in the cavitated liquid they may be attributed to these forces. As a matter of fact it has been found experimentally that none of the peculiar chemical and physical effects of audible sounds (also ultra-sounds?) of interest in commercial processing, occur when the sound intensity is below a level necessary to cause cavitation. Furthermore, even when the intensity is very great, the disintegrative or synthetic effects may be abolished by imposing pressures too great to permit cavitation.

Therefore, the problem of utilizing sonic energy involves certain definite considerations:

1. The maintenance of a sound field of sufficient density to cavitate the system.

2. The maintenance of suitable temperature, pressure, and other conditions for maximum energy of cavitation collapse.

Maintenance of a greater than critical sound field density depends upon the capabilities of the sound transducer, the physical nature of the liquid system to be cavitated (vapor pressure, viscosity, degree of gas saturation, homogeneity, etc.), and upon the manner of exposure of the liquid within the sound field. The relative importance of these various factors varies from one case to another and may best be illustrated by discussions of particular applications.

Disruption and disintegration

If a two phase liquid system (for example, mineral oil or butter fat in water) be cavitated, the particles of the disperse phase are quite rapidly subdivided with the result that an emulsion is produced. The stability of the product will depend upon the nature of the two phases, the presence or absence of a stabilizing agent, and the degree of dispersion, as is the case with emulsions prepared by other means.

The degree of dispersion, for some reason unexplained as yet, seems to depend upon the frequency of the sound waves producing the cavitation; the higher the frequency the smaller the particles. Thus soy bean oil in water is broken into particles of 50–100 millimicra in diameter at a frequency of 300,000 cycles per second, into 1 micron size by 9,000 cycles and into about 4 micra units at 1,000 cycles. It is known that the size of the cavities themselves is governed by the frequency of the wave but this affords no clear explanation of the observed particle size-frequency relationship.

The fact that degree of dispersion does depend on the frequency indicates, of course, that in any operation designed to produce a stable emulsion the highest feasible sound frequency should be used. On the other hand the efficiency of available sources of sound diminishes tremendously with increased rates of vibration. Consequently, in practice it is necessary for economic reasons to operate at as low a frequency as is commensurate with the desired results.

The gas phase (actually constituting a third in our so-called two phase system) is important. Dissolved gas (either air or some other gas) provides nuclei for the formation of cavities. Without it fewer such spaces are formed and efficiency is greatly reduced. On the other hand, the presence of too much gas tends to reduce the efficiency of collapse through a cushioning action, even though cavitation be more vigorous.

Closely coupled with the influence of dissolved gas is that of hydrostatic pressure. Obviously, if the external pressure be too great, the formation of cavities may be prevented; if it be too low, the formation of cavities may be facilitated but the force of collapse, which depends largely on atmospheric pressure, will be diminished. It has been found that the most efficient operating pressure for certain systems is somewhat below atmospheric, although in actual industrial practice normal pressures are usually not altered.

Up to now, the emulsifying action of sound waves has had its most extensive development in the processing of dairy products, particularly milk and ice cream. The homogenization of milk has been accomplished with sound transducers of 360 cycles per second frequency, and the product is being marketed successfully.

In common with pressure homogenized milk, there is a definite improvement of flavor and an insurance of uniformity of composition because of failure of cream to rise. The vibrated product has not, thus far, shown some of the objectionable features of the pressure homogenized product. There is apparently no sedimentation or rancidity developed on standing. Furthermore, the bacterial count of the milk, instead of increasing during the treatment, is greatly decreased, thereby improving the keeping quality.

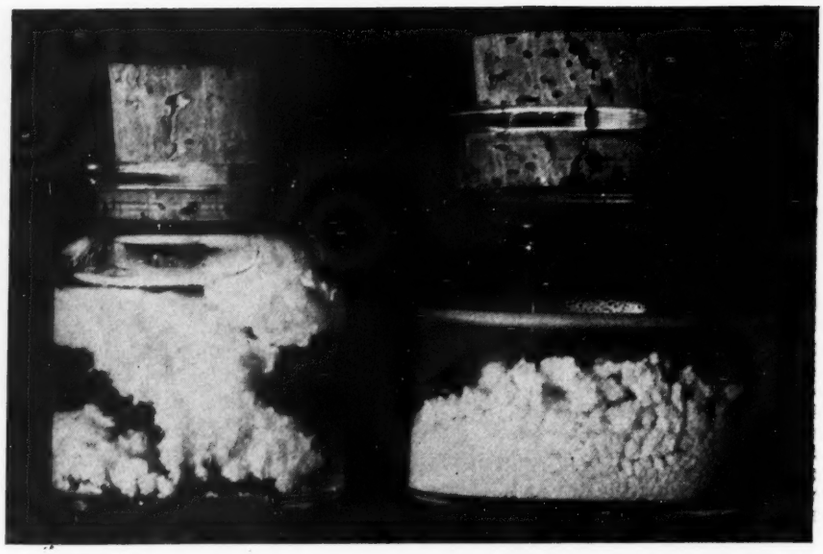


Fig. 3. Curds formed by rennet coagulation of milk in the stomach. Left and right, respectively, represent the two extremes encountered in unprocessed market milk.

Very little can be said as yet of the cost of such vibration homogenization beyond the statement that it will be no greater and probably much less than the cost of pressure processing by usual methods.

Incidental to homogenization is the reduction of curd tension in milk, so that the curd formed by the action of stomach secretions is no longer large and firm, but is small, soft, and flocculent. Curds of the latter type are necessary in the feeding of infants and are desirable in the diets of many adults.

The exact mechanism of curd reduction by sonic cavitation is unknown but there is evidence that the great increase in fat surface resulting from homogenization allows the surface condensation of a considerable proportion of the casein, thus, in effect, diluting and weakening the curd matrix.

When it is desirable to maintain a cream line, the process may be carried out in such away that cream separation is approximately normal. Details of this process are not pertinent here.

The homogenization of ice cream-mixes by intense vibration has also been developed to commercial practicability. In this case, as in that of milk, the immediate action is dispersion of the butter fat particles, and the result is a smooth texture in the finished ice cream. Investigations on both laboratory and commercial scale have shown the product, in most cases, to be on a par with ice cream manufactured in the usual way, in so far as flavor and texture are concerned, particularly when butter or gelatine mixes are used. In all experiments thus far a low frequency (360 cycle) oscillator has been used. Perfect results for all types of mix will probably await development of efficient transducers of higher frequency to produce a somewhat higher degree of dispersion.

One of the effects of intense sound waves first observed was the killing of bacteria in liquid suspensions. This phenomenon appears to be simply another instance of the disruptive action of cavitation collapse. It has been found that pure cultures of bacteria, both harmless and pathogenic, can be sterilized by prolonged exposure to sonic cavitation produced by any sound frequency from 120 cycles upward. The organisms are simply torn to unorganized debris by the force of cavitation collapse.

If this bactericidal action can be applied economically to the sterilization of fruit juices, beer, milk or other liquids, it may prove of considerable importance. Unfortunately, hopes in this direction have not yet been realized practically. The present status of the problem may be summarized as follows: Liquids may be sterilized completely by prolonged exposure to intense sounds. The duration of exposure necessary to sterilize is inversely related to the frequency, assuming equal sound intensities. There-

fore, the exposure necessary at lower frequencies is too great for practical purposes, while no commercially feasible apparatus has yet been developed to operate at frequencies above approximately 1,000 cycles per second.

In spite of this impasse, sonic bacteriolysis is already of some practical importance. As pointed out previously, the keeping quality of sonically homogenized milk is improved by this incidental action. Furthermore, the physical disintegration of bacteria and other cells by cavitation has come to be a recognized method for the preparation of certain vaccines and immune sera. It may also prove useful in the separation of certain enzymes from plant cells such as yeasts and molds.

Aggregation.

Quite the opposite of dispersion is the aggregation of particles in suspension produced by sound waves under favorable conditions. Much has been written recently about the precipitation of smoke and fog by sound. Metallic sols, such as that of gold, rapidly aggregate and precipitate. The conditions necessary for this action are not clearly defined since very little attention has been given the problem except in the case of aerosols.

Only one possible use of this action in food processing appears at the moment. When milk or cream is cavitated at temperatures below the melting point of butter fat, churning occurs rapidly and butter is recovered, leaving a negligible amount of fat in the remaining butter milk. Sonic churning appears to be an improvement over older methods in certain respects although the process awaits extensive investigation and development.

Acceleration of Reactions

Acceleration and activation of many types of chemical combinations by sonic cavitation, have been studied. For example, it has been found that most reactions which proceed at a slow rate normally may be speeded up. Furthermore, a number of reactions which do not occur under normal conditions, such as the oxidation of water to hydrogen peroxide in the presence of atmospheric oxygen, occur during cavitation. In most of the latter cases the rates are slow, and the amount of end product is usually small by comparison with the total volume of the reactants. Some proteins, though not all, are denatured at a fairly rapid rate over a wide range of hydrogen ion concentration. When denaturation by sound is possible at all it occurs only in the presence of certain specific gases. For example, egg albumin is altered as to solubility in the presence of oxygen or carbon dioxide but remains unchanged in the presence of hydrogen or nitrogen.

Among the normal reactions accelerated by intense sound may be mentioned hydrolyses, saponifications and esterifications.

The mechanism through which cavitation operates to produce chemical change is another of the problems awaiting final clarification. One might expect local or mass heating of the reacting mixtures following cavitation collapse, which heating would naturally accelerate combination or hydrolysis and this may be an important factor in certain cases. However, it cannot explain the oxidation of sodium chloride to produce free chlorine, nor can it explain the formation of hydrogen peroxide from water and oxygen. Furthermore, the fact that serum albumin is unchanged by cavitation, while egg albumin is altered, constitutes strong evidence that thermal effects are not responsible since it is known that these substances behave similarly when heated.

Recently it has been found that visible light is emitted during cavitation of a great many pure liquids, including water, and liquid mixtures. This suggests a degree of molecular or atomic excitation not considered heretofore. It seems likely that many of the chemical effects of intense sounds are due to activation of one or all of the reacting molecular species.

One illustration of the application of sonic acceleration should serve to point out the possibilities of the principle in processing industries. The maturing of distilled spirits involves essentially the formation of esters by combination of higher alcohols and aldehydes with acids derived from wood, plus a certain amount of oxidation. Both of these changes are known to proceed slowly, and furthermore both are accelerated by cavitation. Therefore, it was not surprising to find that raw spirits containing infusion extracts of charred white oak, could be brought to maturity in a few hours of active cavitation.

In this brief survey no mention has been made of the aeration of liquids, acceleration of solution rates, or acceleration of extractions. Nor have we mentioned the rather conflicting evidence as to the action of sound waves on various enzymes. However, all of these are but extensions or combinations of the three general principles outlined above, viz., dispersion, aggregation, and activation.

Apparatus for the production and application of sonic cavitation need not be described here since the descriptions would be obsolete before the article could reach publication. The Submarine Signal Company, of Boston, Massachusetts, is manufacturing units for use in certain industries and developing new apparatus as rapidly as the demand arises. Most laboratory apparatus has been built by individual investigators but it is expected that suitable small scale units for experimental purposes will be on the market shortly.

The industrial hazards of exposure to very intense sounds have not been thoroughly investigated. In practice, however, it will be wisest to enclose the vibrating units in sound-proof structures to obviate discomfort and possible functional or structural damage to the workmen.

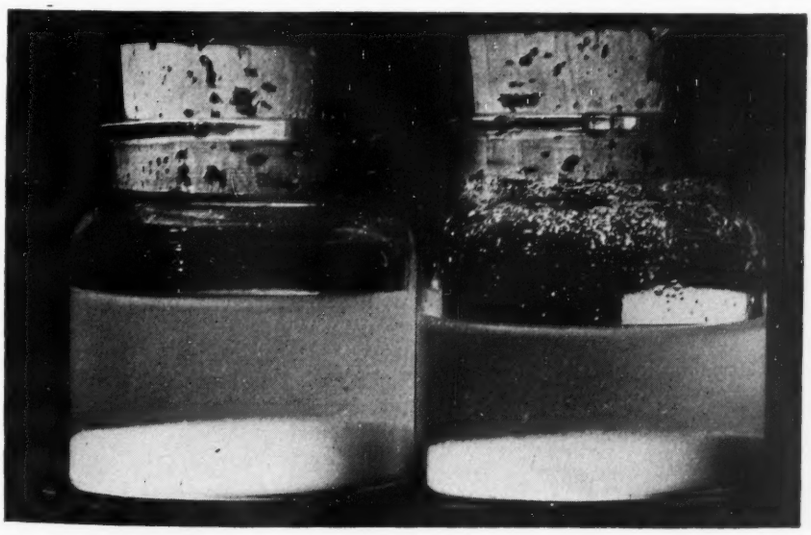


Fig. 4. Curds formed by rennet coagulation of (left) whole market milk boiled actively for three minutes, and (right) the same milk sonically cavitated. The curd masses are very small in both cases. Compare with Fig. 3.

QUALITY SEPARATION
By Differences of Density

By L. V. BURTON
Editor of FOOD INDUSTRIES

Part III

A UNIT OPERATION OF FOOD ENGINEERING

Separation

► Quality control is achieved in many ways. In the method discussed here, it is put into effect by automatic separation of raw materials into two streams having different properties or values. In principle, the method described is one of automatic separation of substances which have very slight differences of specific gravity or density.

This is Part III of No. 12 in a series on the unit operations of food engineering.

In-bound Conveyors

IN ORDER to avoid continued build-up of temperature of the brine from hot peas coming from the blancher it is necessary to cool them *en route*. Mechanical conveyors or flumes may be used for the purpose. If the conveyor is used, it is necessary to spray the hot peas with cold water at a sufficient number of points to insure that the temperature is reduced to the desired figure.

Where flumes are employed, the length of the flume governs the time of contact of peas and cold water. The relative amount of water and of peas can be determined and the correct number of pounds of water per lb. of peas in the length of flume can be calculated. The specific heat of peas is given by Brown as 0.88. In those plants where flumes are used, the cooling flumes are very long. One installation was 56 ft. in length. The actual length is not a fixed figure though the presence of double-U turns which had no relationship to actual conveying problems is indicative that they were installed to permit the requisite cooling time to elapse before the peas were put into the quality separating machine.

Take-Away Conveyors

In the matter of design and construction of the conveyors which carry the peas from the quality separator to the next operation there is a great divergence of practice, some of which is of doubtful value. It is more than a mechanical material-handling problem, for the adhering salt brine must be washed off. Whether the absorbed salt can also be removed to a degree of uniformity is a matter of dispute.

In certain plants it is apparent that considerable thought has been applied to the problem, particularly in those which employ flume conveyors. In one such plant the take-away conveyor was 72 ft. long while in another it was about 100 ft.

F. W. Thorold, hydraulic engineer of Chisholm-Ryder Co., suggests that peas in a flume should move at a velocity of about 2½ ft., never less than 2 ft. per second, to keep all peas moving and avoid stoppages in the flume. If it should require 30 sec. to reduce the temperature of the peas, then the flume would be $2 \times 30 = 60$ ft. long (minimum), or 70 ft. for satisfactory performance. Higher velocities are to be avoided if they shorten the cooling time too much.

If adequate brine removal is to be obtained, it is a reasonable assumption that the time of contact with fresh water of the peas which have come out of the quality separator should be at least as long as the length of time in which they were immersed in or in contact with brine. (One concern advocates fresh water at 140 deg. F. as the best for washing off the brine. They find that less water is necessary for this washing, if it is warm.) Then there would seem to be a desirable factor of safety of—let us say for the sake of argument—at least 50 per cent. Research should be able to determine the correct factor of safety and express it as some sort of a mathematical formula.

In general, where adequate engineering has been employed, the brine removal operation is a rather lengthy operation, but where apparently no engineering has been used, it is a short and sweet operation. Yet it seems impossible to leach out the salt in 3 or 4 seconds that was soaked up in periods up to many times as long. One installation was observed where the brine removal would have had to be accomplished in about 2 seconds after an immersion of considerably longer duration. And, worse yet, because of a water shortage, the water was to be used over and over again with but small additions. This plant had found it necessary to cut down the salt content of the canning brine by nearly 50 per cent and, at the time of this study, had not found an adequate solution of this new problem.

Softened Water for Brines

In order to avoid the well known toughening effect of hardness in water, several concerns use only softened water in their canning brines. When these companies installed quality separators they hooked up their soft water lines to the separators to insure that no ill effects from hard water could occur here. This practice is not general, but is scientically sound and deserves further use in all hard-water country.

Operating the System

Up to this point, little has been said about how to use the specific gravity system of quality separation to get

the best results. The equipment maker's responsibility ceases when he has delivered a well made and well-designed machine. But how best to use it is the food manufacturer's responsibility just as much as if he had purchased a motor truck. How to employ a truck at a profit is not the truck builder's responsibility. To be sure, he can give helpful suggestions but the decision lies with the new owner. So it is in using quality separators. And experience counts.

One operator who thoroughly understands their use said that it took several years of experiment to work out the best methods; that it was about seven years after he got his first quality separator before he was sure he was getting the greatest possible good from it. Also, he added, he would now be unable to operate a "quality plant" without these machines supplemented by automatic brine-density controllers.

Other operators assert that a minimum of one season of use is necessary to understand what they can do and how to make the quality separator pay the maximum of profit.

Another has said that there are no rules for operating them: that "you must use your head."

The canner's or freezer's responsibility includes the decisions which follow:

1. Where to install the machine in the production line.
2. Whether or not to blanch before grading.
3. How much to blanch.
4. How much to cool the hot peas.
5. How much to freshen or wash the peas after they have come from the grader.
6. Whether to operate the machine on batches in special cases, or on all peas.
7. What sieve-sizes to grade for quality.
8. Where, i.e., at what brine density, to make the separation of lighter and heavier material (peas).
9. Whether to equip for a light blanch for freezing and have a second blancher for a heavy blanch for canning.

No. 8 is the most important decision, and no one can lay down fixed inflexible rules to fit all cases. From E. N. Wood the following information is obtained:

To float "fancy" or best quality peas a brine density between 35 and 27 deg. sal. is usually required—a fairly wide spread.

To float "extra standard" or "choice," i.e., second quality peas, a brine density of about 45 deg. sal. is needed. Or, to put it on a density, i.e., specific gravity, basis:

Fancy peas.....1.050 to 1.065 sp. gr.
Choice peas .....1.065 to 1.086 sp. gr.
Standard peas .....1.086 to 1.092 sp. gr.
Soaked Dry peas...about 1.15 sp. gr.
Dry peas .....about 1.20 sp. gr.

The foregoing figures are not recommended brine-strengths, but are general observations from actual practice. Where plant laboratories are available, tests should be made of the raw materials in every lot. Later, these tests can be compiled and compared with the corresponding data from the actual processing operations. Such data would include: blanching time and temperature, brine density, brine temperatures, percentages of the different grades of quality and the like. When different data from both laboratory and plant have been accumulated so that an intelligent comparative analysis may be made, it will then be possible to determine the dominiating characteristics to be used as a guide in controlling future operating conditions to produce the most satisfactory results. Factors, other than the distribution of the several quality-grades in a given lot, which may conceivably have a bearing on the selection of the brine-density, are the going market values for different grades of quality, and whether or not a particular separation would give enough of a production-volume on some one grade to permit economical operation.

Nevertheless, another commonsense view must always prevail. It is never possible to make a satisfactory separation of quality grades unless the given lot of raw material actually has different grades of quality mixed up in it. The machine will never put anything there that is not already there when the raw material comes

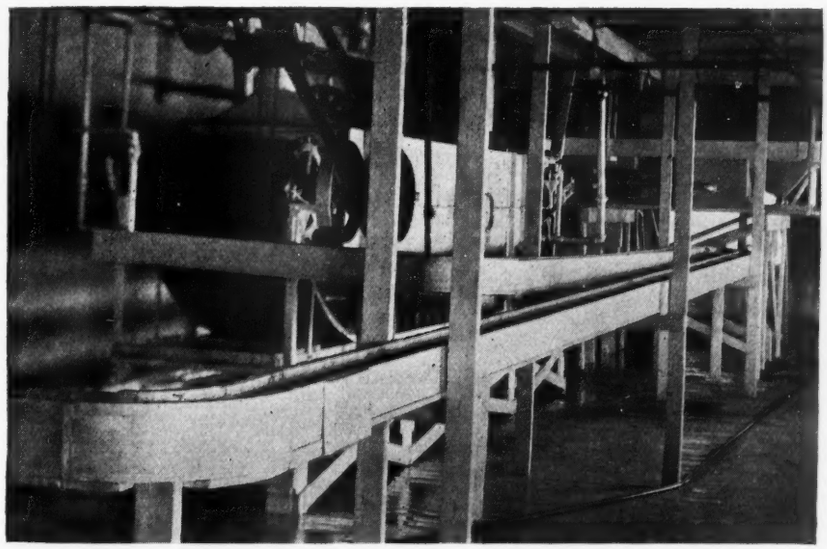


Fig. 12. View of a flume conveyor, showing the method of attaining greater length of travel from blancher to grader.

Fig. 13. Feed end of the picking tables which are fed by a flume conveyor. The gadget to the right of the feed hopper is a rod-screen to separate the water from peas. Note the length of the take-away conveyor from grader in the background.

in from the field—any more than so-called magician can pull a rabbit out of a silk hat unless he first has both a rabbit and a silk hat. This is the reason that quality graders sometimes appear to work best at the end of the season.

Quality Separators for Mechanized Inspection

At several plants it was observed that various makes of quality graders were in use at unexpected places for the purpose of removing splits and skins. One plant ran all peas before blanching through a grader with a brine density of 2 deg. sal. thereby removing about three-fourths of the material that would be removed on the inspection belts. Another plant used a different machine with a 10 deg. sal. brine to remove ALL the material that would normally be taken out on the inspection belts. No "pickers" and no inspection belts were employed here.

Other Uses for Quality Separators

One adaptation of the use of the quality separator for mechanized inspections is found in lima bean canning, especially the canning of so-called Baby Limas. In this product uniformity of color of the beans is very important. And lima beans became whiter as they become more mature and more dense. Separation here is possible on the specific-gravity basis, but there is a certain degree of overlapping or mixing of white and green beans in the marginal zone between two separated qualities. To get *all* the white beans out of the better quality therefore requires some manual picking on the inspection belts. But mechanized quality separation combined with proper size grading through sieves has largely reduced the amount of inspection-belt labor in picking out the white from the best quality.

Details of the practice vary, however; some canners simply screen or sift out the Baby Limas (manually removing the whites) and then pass the over-size beans through a quality separator followed by further manual removal of the white ones. A further refinement of this procedure is that of making three quality separations of the larger sizes. Though climatic and soil conditions vary the required brine density very considerably, the usual first separating brine is in the vicinity of 45 deg. sal. while the second is at about 60 deg. sal.

Some canners report that a proper choice of brine density will eliminate about 90 per cent of the white beans. Some of them also report that not all makes of machines are satisfactory in this particular service.

Another use is said to be found in separating tough and tender kernels of cut corn—an operation that is profitable in canning of whole grain corn by the so-called waterless packing method. It is desirable here because on a single ear of corn there are kernels of varying degrees of maturity, the oldest being at the butt-end and the youngest at the tip end.

Cost of Quality Separation

In view of the occasional complaint that the cost of separation of quality by this method was more than could be recovered in increased value, it is interesting to investigate how much expense is picked up.

First comes the charge for depreciation of the machine—a figure that depends on the size of the investment. And also the cost of proper installation. Second is the direct operating expense. For power, is the cost of operating a 3-hp. electric motor on the pump, and for operating the various conveyors, and pumping the water used.

The salt used for making the brine is of the same kind used for making canning-brine, and the amounts needed vary depending on the brine-density used. One plant reported 0.88 lb. of salt used per case of 24 No. 2 cans of peas. Others went as high as 1 lb. of salt per case. This covers only the salt used in the quality separator.

On the matter of water consumption, the amount used in making brine is trivial compared to the amounts used for cooling and washing before and after the quality separation operation. No figures on the water consumption are available because of the fact that canners seldom meter their water for the entire plant and rarely meter it by departments.

Again, it was noticed that plants preparing peas for freezing utilize a great deal more rinsing water than those utilizing peas for canning only. Therefore, a part of the water cost is chargeable to bacterial control, particularly under the exacting standards of the freezers, such as Birdseye Frosted Foods, where bacterial control is rigidly enforced. Low bacteria counts, obtained by generous washing with pure water, are required by many freezers before any food goes into the freezing machines.

Labor cost for quality grading is low but extremely variable. Where automatic control is used one man can look after as many as six machines if they are located close together. But, irrespective of automatic control, it is necessary to supervise these machines, to see that screens are kept clean, that plenty of salt is available, that clogging does not occur, or to replace a possible blown fuse. Also he must exercise intelligent supervision over the quality "cuts" and make needed changes, or call his supervisors, if the raw material changes its character materially.

Pros and Cons of Quality Separation

So far, only the favorable aspects of quality separation have been presented. What are the unfavorable aspects? Why are some manufacturers reluctant to use quality separators? What are the complaints?

Before beginning the field investigation, a few conferences were held

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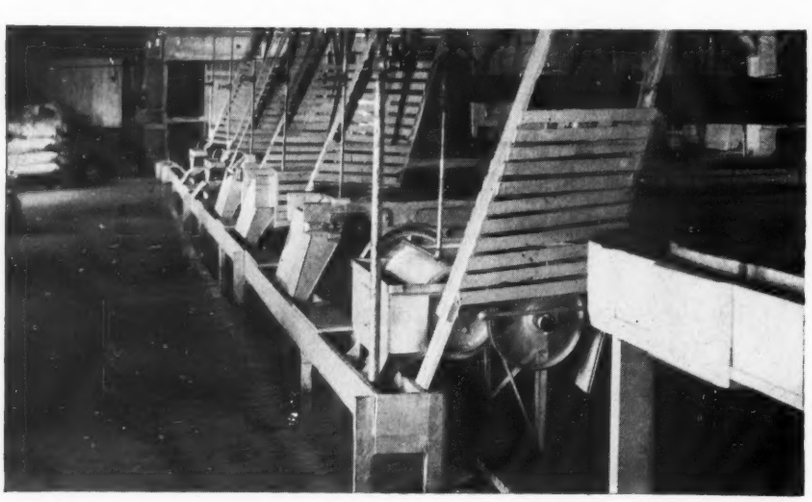


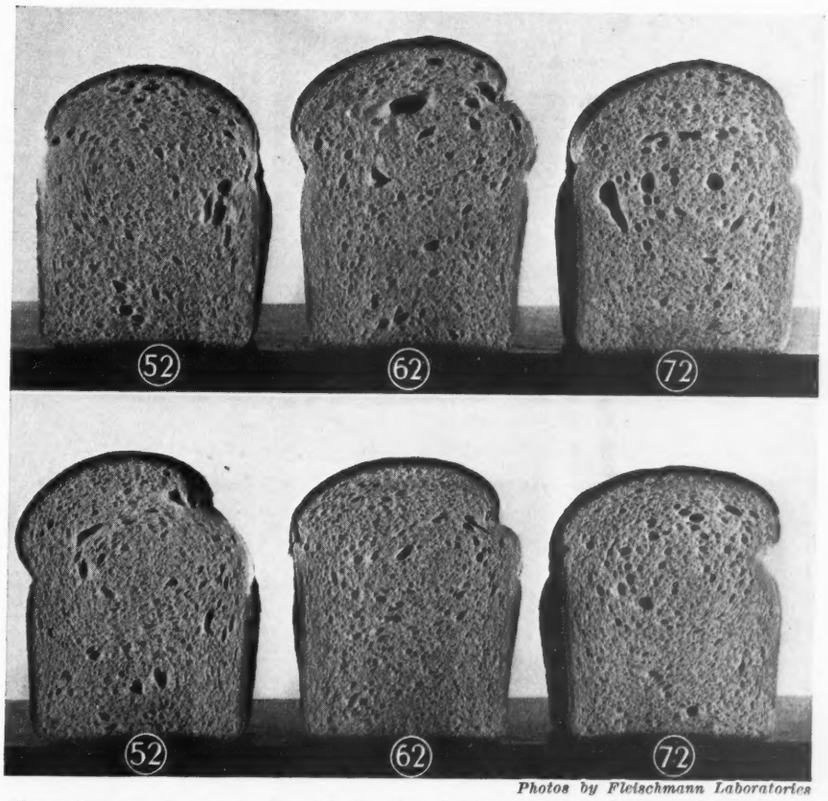
Fig. 14. Discharge end of picking tables. Inspected peas fall into another flume conveyor. (1944)

Quick Method of Calculating WATER ABSORBING POWER of Flour

New alignment chart gives quick and easy results. Can flour millers control the water absorption of their flours?

By CHARLES H. BRIGGS

Howard Wheat and Flour Testing Laboratory, Minneapolis, Minn.



Photos by Fleischmann Laboratories

UPPER PHOTO: ***Loaves made with 52, 62 and 72 per cent moisture, using sponge dough, weight of flour being the same.*** **LOWER PHOTO:** ***Loaves made with 52, 62 and 72 per cent moisture, using straight dough and scaling off loaves of equal weight.***

TO SAVE TIME a good many flour chemists and technical production men have calculated and are using tables to show the water-absorption value of flours at a moisture content favored by them. Some of these tables are quite complete; some are not.

In any case, the calculation of useful tables is often laborious. Under government direction two men worked steadily for two years to calculate and compile a book of tables on psychrometric values. When the book was completed, one University of Minnesota student prepared an alignment chart with only one week's work. This chart gave the same results as the tables with slightly greater accuracy.

Realizing some of the possibilities of alignment charts, the author looked into the feasibility of preparing a chart for determining flour absorptions on various moisture-content bases. Such a chart was prepared and is shown on the next page.

It is very simple to use. A ruler is laid from the actual moisture value to the determined absorption value of the flour. Where this line crosses the "pivot line" fixes a point which can be termed the "pivot point."

By placing the ruler on this point and on the desired moisture value, the other end of the ruler indicates the desired absorption value of the flour. Incidentally, the "pivot point" designates the absorption value of the flour on a moisture-free basis.

The moisture bases for absorption calculations range from the moisture-free basis to the 15-per cent moisture basis. Fifteen per cent moisture is the maximum percentage of moisture permitted in flour according to specifications adopted under the Federal Food and Drug Administration. Moisture contents ranging through 13.5, 13, 12 and 11 per cent have been used. For reasons to be given later, the 11 per cent moisture basis is preferred, particularly since it seems to be the moisture basis at which flours tend to stabilize as they age.

So much emphasis is placed on the water-absorption value of flour because a flour that has a high-water absorption value is a flour that will yield an extra large quantity of product, be that product bread, cake, biscuits or pie-crust. Each 1 per cent more of absorption means nearly 2 lb more bread per barrel of flour

Water absorption of flours is usually expressed as the percentage of water required to make a satisfactory dough. This percentage is based on the flour. It is the number of pounds of water required by 100 lb. of flour to make the best product of which the flour is capable. This absorption value may be expressed as pounds per barrel of flour or, as is common in Great Britain, as quarts per sack. The sack is 280 lb., and the quart is the Imperial quart weighing 2.5 lb.—20.294 per cent larger than the United States quart. Quarts per sack are convertible to per cent absorption by multiplying by the factor 0.89285 or dividing by the factor 1.12. Basing the absorption on the flour used per pail of water has

almost disappeared in this country.

American bread flours have a much higher absorption than the flours of western Europe. The famous Hungarian flours have no higher absorption than the weaker French, German and British flours. The causes of the low absorption of these flours are partly in their lower protein and partly in the extraordinarily high moisture content which they carry. With moisture as high as 16 or 17 per cent, it is not surprising that 55.3 per cent absorption for pan breads

(*Turn to page 173*)

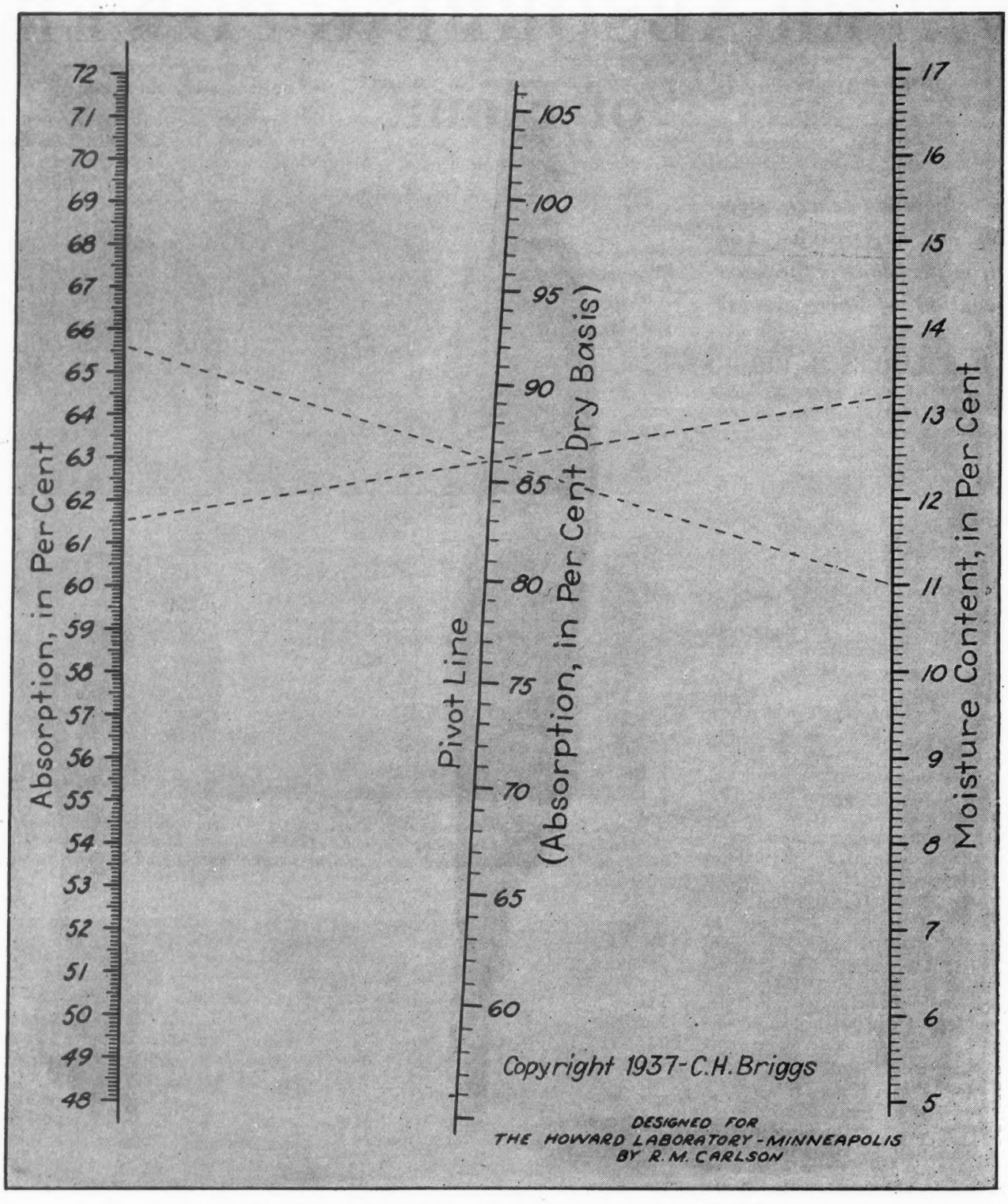


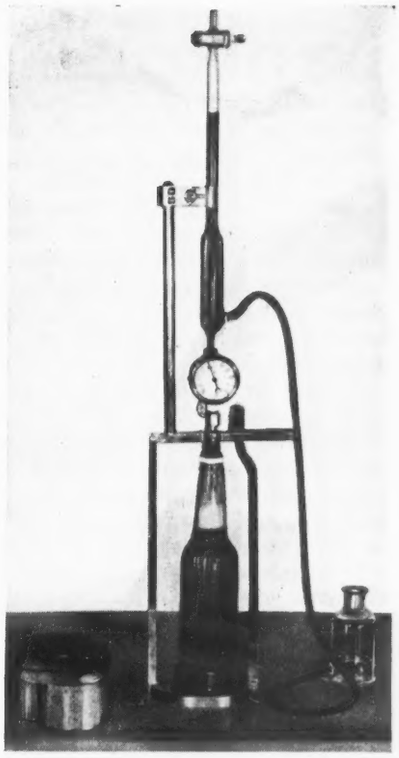
CHART FOR CALCULATION OF WATER ABSORPTION OF FLOUR

To obtain the water absorption of a flour on a given moisture basis, lay a straightedge from the value of the actual absorption to the value of the moisture content (eg., 61.5 per cent to 13.2 per cent) and locate the point where the line crosses the pivot line. Through this pivot point, turn the straightedge until it passes through the desired moisure content, (eg., 11.0 per cent.) On the absorption scale the straightedge will then indicate the desired absorption (eg., 65.6 per cent). The pivot point also indicates a theoretical value of absorption on a dry basis (0 per cent moisture). This is a quick way to determine water absorption.

ELIMINATION OF AIR From Liquids

Important to Quality Control

By RAYMOND N. BOSTOCK
Consulting Engineer, Newark, N. J.



This is the apparatus devised by the American Can Company for determining the CO_2 and air content of bottled or canned carbonated beverages, as described in this article.

THE PRESENCE of air and oxygen in bottled and canned food products is well recognized as a problem. The oxidation of organic matter due to its presence and the consequent formation of carbon dioxide has been demonstrated. It is also true that oxygen sometimes brings about chemical changes that damage delicate flavors. In many cases, however, it is rather difficult to be sure of the role played by air and oxygen in deterioration of flavor because there are so many other factors which are of much greater importance, such as heat treatment, light, metallic contamination and micro-organisms.

It is, therefore, with the other influences of air that we are chiefly concerned. Carbonated products of all kinds are particularly subject to these other physical influences. Carbonated fruit juices, cider, beer and the other more delicate drinks depend so much for their particular and proper flavor on the maintenance of an exact amount of carbonation. With too little carbonation, the taste is flat —with too much, the bite of the gas makes it impossible to taste any delicate flavor. Air, or the lack of it, has so much to do with the quality, quantity and maintenance of proper carbonation that the manufacturer, to control the quality of his product, must give it serious consideration.

It is not sufficient to be sure that every bottle of product sold has exactly the right amount of gas dissolved in it. It is of equal importance that the drink reach the lips of the ultimate consumer in a condition as near to ideal as possible. There can be no control over a bottle after it is sold, but the carbonation can be such that the beverage will not go flat too quickly after the bottle is opened.

All carbonated products go flat and lose all their dissolved gas eventually. The rate at which the gas is lost depends on temperature, the amount of agitation that the liquid receives and the inherent stability of carbonation. The stability of carbonation depends in turn upon everything that is present except water and carbon dioxide.

Carbon dioxide will dissolve in water in varying amount according to the temperature. The lower the temperature the more gas will dissolve. Its solubility is also dependent on the pressure. The higher the pressure the more gas will dissolve. At atmospheric pressure the solubility is relatively small. For instance at 40 deg. F., the solubility is 1.45 volumes. This means that one liter of water will dissolve 1.45 liters of gas measured at atmospheric pressure and 32 deg. F. But the amount of carbon dioxide used in any carbonated product is always greater than this, varying from 2.5 volumes to as high as 5.5 volumes in some cases. To hold the gas in solution there must be a pressure in the bottle. At 40 deg. F., three volumes requires about 16 lb. per sq.in. and 4.0 volumes requires about 26 lb. per sq.in. Therefore any carbonated product, when opened and exposed to atmospheric pressure, is naturally unstable and starts to lose gas. If the product consists of pure water and carbon dioxide it is relatively stable. If it contains solid particles or air in solution it is much less stable.

Either solid particles or air in solution act as centers on which bubbles of carbon dioxide can form. Air is much less soluble than carbon dioxide yet while there is pressure on the bottle it stays in solution. When the bottle is opened its tendency to form bubbles and come out of solution is very great, which it does. And as these small bubbles rise to the surface, the agitation produced causes carbon dioxide bubbles to form around them and it is commonly said that every cubic centimeter of air that comes out of solution carries with it seven cubic centimeters of gas. Probably the proportion is much greater than this. The presence of 15 or 20 c.c. of air

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▶ ***Air in bottled and canned food products is often a cause of flavor deterioration and other changes. Also, in the case of carbonated beverages, the presence of air interferes with proper carbonation and cuts the length of "life" of the beverage after the container is opened. The problem discussed in this article is one met by***

Bottlers **Brewers**
Canners **Preservers**

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dissolved in a 12 oz. bottle will cause it to go flat in a few hours after opening. In the absence of air, the same bottle might retain enough carbonation for several days to be still drinkable.

Aside from the length of time that the carbonation will last, the quality of the carbonation is largely determined by the amount of air present—or its absence. A fine natural carbonation, such as is obtained in champagne or cider gives a smooth tang in the mouth, just enough to give life without filling the mouth and throat with large volumes of gas. This is due to the fact that the bubbles are small and they do not come out of solution too fast. Large amounts of air in solution cause the rapid formation of bubbles in the mouth which are associated with coarse carbonation. The stability of carbonation is so low that the higher temperature of the mouth causes gas to come out of solution much too quickly.

One of the first requisites of proper control of carbonation is a test for volume that is reliable under all conditions. The usual test for the amount of carbon dioxide in solution is the one that is dependent on the temperature and pressure. This test will not give the same results under all conditions. The same bottle will give somewhat different results depending on the temperature. It is, however, the most practical test known and if carried out under limited conditions it will give results that will be sufficiently accurate for practical purposes.

The test depends on the fact that at any chosen temperature the solubility of carbon dioxide in water is directly proportional to the pressure of carbon dioxide in contact with the water.

The volume tester consists of a device for puncturing a bottle crown and maintaining a tight seal, with a pressure gage to read the pressure above the liquid and a thermometer to read the temperature. The crown is punctured and the bottle shaken till the pressure ceases to rise. The pressure is read, the temperature of the liquid is taken and the volume is looked up on the chart. In just such a manner would a production man check the carbonation as the product comes from a filling machine. Every thing is fairly accurate providing there is no air entrapped above the liquid in the bottle. If air is present—and probably it is—the results of the volume test are not very accurate. To determine the volume of carbon dioxide the pressure of that gas above the liquid must be known. If air is present, part of the pressure is due to air and the gage reading gives only the total pressure.

At temperatures below 40 deg. F. it is quite possible to have errors showing as much as 1.2 volumes too high caused by the presence of air when the test is made. If the true volume were 2.8 and there were 20 cc. air present in a 12 oz. bottle, the

This error is partly overcome when making the test by releasing the pressure that first forms after puncturing the crown of the bottle. By this procedure part of the air is blown off to the atmosphere—*but only a part.* Sufficient often remains to give a serious error. The results may still be as much as 0.35 volumes too high, and even this is far too great an error to give any accuracy in the control of carbonation. If the air is not present in the first place the error will not occur at all.

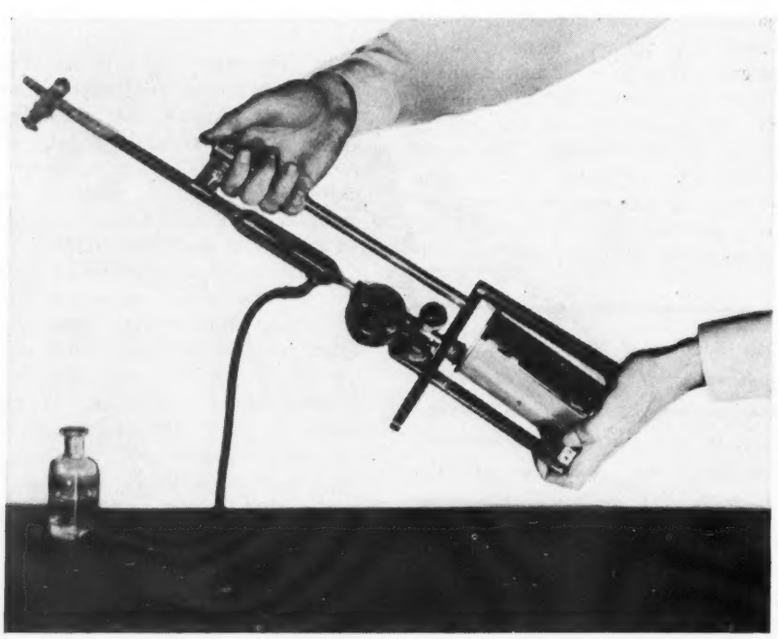
Fortunately, for simplicity of control, there is a compensating error which enters in at higher temperatures which makes it possible to get fairly accurate test results with the ordinary test. After releasing the pressure in the bottle to atmospheric pressure, some gas must come out of solution to take the place of the gas blown off and to develop pressure above the liquid. This leaves somewhat less gas in solution and, if no air is present, the volume test will show a result lower than it should. At temperatures below 40 deg. F., the error due to this cause is small but as the temperature rises this error becomes increasingly great. If the volume in solution remains the same, the higher the temperature the greater will be the pressure above the liquid and the more gas will have to come out of solution to form this pressure. At a temperature of 90 deg. F., this error will cause readings to be 0.2 to 0.3 volumes lower than they should be.

At temperatures between 60 deg. F. and 70 deg. F., the error due to this cause will result in readings 0.1 to 0.15 volumes lower than they should be. At the same time the error due to the presence of air becomes smaller with rising temperature because with higher pressures shown on the gage the pressure caused by the air becomes a smaller and smaller proportion of the total. We find, therefore, that in the range between 60 deg. F. and 70 deg. F., the two errors sometimes compensate each other and practically never will any result be more than 0.1 volume too high or too low.

This may best be illustrated by the table. This table shows the volume that would be read by the ordinary test method at various temperatures and with varying amounts of air present for a 12 oz. bottle assuming that the actual gas volume is 2.65. By the ordinary method is meant blowing the pressure down to atmospheric before reading temperature and pressure.

The relation between results at various temperatures changes somewhat with the volume originally present test would show 3.9 volumes.

(*Turn to page 175*)



To release as much gas as possible from the beverage under test, the apparatus is shaken, as shown in this picture. Before testing, the device must be returned to a vertical position, so that the gas can escape into the head-space of the container and thence into the apparatus.

MAPLE . . . *Favorite Food Flavor*

As a syrup, a sugar, or a concentrate, the processed sap of the northern hardwood maple tree is widely used for its distinctive flavor

By

FREDERICK S. MORISON

Belmont, Mass.

MAPLE PRODUCTS are used for just one reason—their flavor. The basis of this characteristic flavor is the natural impurities in the sap of certain hardwood maple trees. This sap is primarily a dilute sugar solution.

The processor accumulates his stocks of all grades from hundreds of small sources. He standardizes, cleans, and converts the syrup into various forms so that he may supply any reasonably expected demand. The leading converters contract in advance for the farmers' entire output.

Proper grading is vital to profitable operation. Selection of grades before processing likewise must be done with painstaking care. Too dark a syrup means a loss in selling value. The only way to lighten color is to use activated carbon. These carbons are not selective, however, and they remove flavor as well as color. Their use is indefensible.

There can be no standards established for flavor, but of necessity buyers in the field become keen tasters. Color is a different matter. The required standard color sets, usually Nos. 5, 7, 9, and 11, are prepared each year as needed by the Bureau of Chemistry and Soils at Washington. Bulk lots of glycerine-caramel are made to match these colors by the several interested state authorities and are distributed at a nominal charge to individual producers in standard 1-oz. bottles with the information necessary to their preservation and use. The State of Vermont makes the following requirements as to color:

1. **fancy syrups** must be no darker than No. 5 of the standards.
2. **grade A or No. 1** syrup must be darker than No. 5 and no darker than No. 7.
3. **grade B or No. 2** syrup must be darker than No. 7 and no darker than No. 9.
4. **grade C or No. 3** syrup must be darker than No. 9 and no darker than No. 11.

Throughout the processing operation, color is the big problem. It is influenced by the speed with which the syrup is heated, the temperature of the heating medium, and "nitre" (scale) which may accumulate on the surface of heating coils and jackets. This nitre may form in blisters, permitting small amounts of syrup to get underneath, caramelize, and darken the whole batch.

The nature of the maple flavor is as yet undetermined. Whatever it is, it is present in very small amounts; it can be destroyed easily by certain chemicals; it is removed largely by activated carbon from which it is not recoverable; and it may be obscured when used in combination with some kinds of food products. Prolonged cooking under vacuum seems to remove an important part of the flavor, whereas cooking to high temperatures at atmospheric pressure seems to intensify flavor. This holds even though some of the volatile odorous substances escape during evaporation, as the odor of boiling maple syrup indicates. Of course, excess caramelization will completely obscure maple flavor. It is only when these darker or caramelized products are used in combination with such other materials as refined sugar, ice cream, or candy that the true flavor comes out. The effect of caramelization seems to stop after imparting color to the finished product and permits the maple flavor to assert itself.

Color may be affected also by microorganisms at the sap spout or bucket, by washings from the trees because of rain, or by insects, dried leaves, and pieces of bark getting into the sap.

The United States Department of Agriculture makes a distinction between maple sap syrup and maple syrup. Sap syrup is made by boiling the sap directly to syrup. Maple syrup may be sap syrup or it may be made by dissolving maple sugar with water to form a syrup of the proper density. The department specifies that *"the term 'maple syrup' should apply only to the finished product, which should weigh not less than 11 pounds to the gallon nor contain more than 35 per cent of water."* This density is a natural equilibrium point for sucrose solutions. Below this point the tendency to spoil increases rapidly, and above it a supersaturated condition exists which results in the eventual crystallization of the excess sugar.

Processing operations are simple. The standard heating unit is the open kettle or tank, jacketed or fitted with heating coils. When the proper temperature has been reached, a filtering medium is added and the syrup is filtered. Before filling containers, the temperature is rechecked to assure sterilization. No further sterilization is necessary, except the precaution of inverting small containers so that the closure will be sterilized by the hot syrup.

The plate and frame press is standard equipment for filtering, although other types may be used. When the press reaches its limit of capacity, the syrup remaining in the cake is washed out before breaking down the press. These press washings, together with drum and tank rinsings should be used to dissolve sugar for making syrup. The reason for filtering syrup is to make it brillant and transparent by removing the "nitre" which is present in unstrained syrup.

Sugar making consists of cooking syrup to the temperature that leaves the desired amount of moisture in

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▶ ***Finished products of one food manufacturing industry are often ingredients or raw materials for one or more other food industries. Too often available information regarding these finished products is lacking.***

In the case of maple products, information concerning the grades, forms, and container sizes in which they are commercially obtainable and the methods of production, storage, and handling is of importance to:

Bakers,
Baked Bean Canners,
Blenders of Syrups and Sugars,
Candy Manufacturers,
Dessert Powder Makers,
Flaked Cereal Makers,
Ham and Bacon Curers,
Ice Cream Makers,
Table Syrup Packers

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the finished product, and then running the cooked syrup into a crystallizer where it is stirred until the grain forms. Then, while still fluid, the sugar is run into containers or molds and allowed to harden.

For manufacturers, the three standard syrup containers are the No. 10 tin, 5-gal. can, and 55-gal. returnable steel drum. The 55-gal. returnable steel drum is the economical unit and the one generally used. Flavor and color do not appear to be affected by light or by the steel and tin containers now in use. Once a syrup is packed sterile, it will remain sterile as long as the seal is unbroken.

Closures with a cork or fibre cushion need a tin or aluminum foil liner. Cork liners can impart a foreign taste, but what is more important, cork is difficult to sterilize by mere contact with hot syrup, and it gives a convenient starting point for mold growth unless absolutely sterile.

Storage of syrup and sugar at the processing plant is beset with troubles. Cool, dry storage below 50 deg. F is best. Partially filled drums should be used immediately, otherwise they would certainly cause trouble.

Hard, dry, crude sugar stored in burlap bags involves a rat problem. Wet, sticky crude sugar causes some loss through draining of syrup and adhering to bags. Also the sugar may mush up under the weight of the pile. As much as several pounds of sugar may stick to one bag which has to be washed to recover the sugar, with the possibility of adding the taste of the burlap bag. Fermentation can and does take place in wet sugar.

Maple Products and Their Uses

Uses	Syrup: Fancy	Syrup: No. 1	Syrup: Manufacturers'	Syrup: Concentrated	Sugar: Fancy	Sugar: No. 1	Sugar: Manufacturers'	Sugar: Crude	Sugar: Maple flavor
Foods									
Bakery fillings and icings	□	□	■	■	□	□	□	□	■
Baked beans (canned)	□	□	□	□	□	□	■	□	□
Blends, cane and maple	□	■	■	□	□	■	■	■	□
Candy	■	■	□	■	□	□	□	□	□
Dessert powders	□	□	□	□	□	□	□	□	■
Flaked cereals	□	□	□	□	□	□	■	□	□
Ham and bacon	□	□	□	□	□	□	■	□	□
Ice cream	□	□	■	■	□	□	□	□	■
Sugar confection	□	□	□	□	■	□	□	□	□
Syrups, maple-flavored cane	□	□	□	□	□	□	□	□	■
Table syrups	■	■	□	□	□	□	□	□	□
Non-foods									
Alcohol	□	□	□	□	□	□	□	■	□
Tobacco	□	□	□	□	□	□	■	□	□

Fancy and No. 1 or grade A syrup should be kept in a cool place on general principles because coolness helps to retain the "new" character besides reducing the mold and fermentation hazard.

Fermentation and mold are the worst enemies in the plant. Fortunately fermentation causes no appreciable damage to flavor. The action seems to be confined to the sugar, and after processing there is no evidence of the results of fermentation save the increase in invert sugar content. Any loss in weight would be small and due to the conversion of some sugar into alcohol and carbon dioxide. If syrup starts to ferment or mold after a container has been open for a while, it is only necessary to heat the syrup to the boiling point, but not boil it, allow the agitation to stop, and skim the surface. The syrup is then ready to use or repack.

Moldy syrup is a more serious problem. Syrup which has been stored properly and which has only a slight mold growth is not appreciably effected in flavor. Syrup with a substantial mold growth, particularly if it has stood several months or more in this condition, has a slight musty taste which no amount of processing will entirely remove.

Fancy syrup is the finest for retail distribution and table use.

No. 1, or grade A syrup is slightly darker than "fancy" and has a little heavier flavor. It is fully equal to "fancy" in quality.

Nos. 2 and 3 grades are suitable only for manufacturers. They are seldom sold separately but are blended with each other, or with some No. 1 syrup, or with syrup made from Quebec sugar, or in such combinations as is suitable to produce a uniform dark, heavy-flavored syrup. The converter has his own formula. Such syrup is used where a substantial amount of color and flavor must be imparted from the minimum amount of syrup. This syrup is convenient to use; it entails no manufacturing complications for the user, and, as there is no loss, costs can be figured on a known maple-cost basis.

Quebec syrup and sugar are conceded to have the most pronounced flavor. The New England and New York state syrups all have about the same flavor value, somewhat milder than that of the Quebec variety.

Fancy sugar occurs on the market mostly in the form of small cakes for eating which range in size from an ounce to a pound.

No. 1 sugar can be used wherever a high grade of product is desired using a substantial amount of pure maple, as in the case of No. 1 syrup. The flavor is good, and the color is suitable for most high-grade purposes.

Crude sugar for manufacturing comes principally from Quebec. The usual form is a square or oblong block of 10 to 15 lb. These blocks are packed in burlap bags containing about 100 lb. each. Buying crude sugar is more risky than buying syrup because a bag of sugar does not always contain blocks of uniform color and hardness. Also, crude sugar is likely to contain trash. This is the main reason why converters have encouraged the making of syrup.

Manufacturers' sugar, the form in which the largest part of all maple is sold, is made from a combination of several grades of syrup. As in the case of Nos. 2 and 3 syrups, the corresponding grades of sugar are rarely sold separately, the object of combining being to establish a uniformity of color and flavor not possible otherwise. Control in the manufacture of block sugar (the common trade name for manufacturers' sugar) begins with the selection of the proper grades of syrup and with checking the invert sugar content of the mixture.

Block sugar is cast in wooden or plywood boxes holding from 50 to 65 lb. In recent years 10-lb. blocks also have become available. Such sugar is made either from straight run or filtered syrup. Even where sugar made from filtered syrup is used, the necessity of guarding against trash, splinters, pieces of paper, or nails from the containers remains. Large users must be equipped with filtering equipment.

The tobacco industry is by far the largest user of maple sugar. The tobacco companies have definite specifications for moisture and invert sugar content. Sugar which meets these requirements is suitable for almost any manufacturer because it contains ample flavor, and because it is suitable for storage in large quantities without loss in weight or spoilage by fermentation or mold.

A substantial demand for crude Canadian sugar still comes from those who use large amounts and who are willing to gamble with its lack of uniformity.

A comparatively recent product is a concentrated maple syrup of about 2½ times the strength of ordinary manufacturers' syrup. Such a product has merit for manufacturers who wish to introduce the minimum amount of sweetening with the maximum of maple flavor. The cost of using such a concentrate should be about the same as for regular syrup.

THE CALIFORNIA CANNERS' EXPERIMENT with cooperative analysis of raw material, production and marketing costs should contribute much information to guide the industry in stabilizing itself. The industry's emergency price agreement promises to be an adequate vehicle for carrying this stabilization into effect. Other canners, as well as other branches of the food industry, may find the means of stabilizing their own portion of the industry by some adaptation of this experiment.

Success of PEACH AGREEMENT *Vital to Food Manufacturers*

THE "independent" California cling peach canners have for several years faced a situation which has threatened ruin to the industry. Large inventories have accumulated from unusually large crop yields. Excessive carry-overs encouraged buyers to anticipate sagging markets and low-cost selling. This was the condition in 1936 when less than 11,000,000 cases were canned, resulting in a carry-over of 4,000,000 sold and unsold cases. The 1937 season's production was 12,235,000 cases with a sold and unsold carry-over of approximately 9,000,000 cases. This year's buyers have been hesitant to handle canned California cling peaches, possibly because of rumors of ruinously low prices. Even the chains and other retail groups which have so spectacularly helped pull other distress crops through overproduction seasons without market gluts have been unwilling to come to the assistance of the California cling peach canners.

The independent California cling peach canners have adopted two corrective measures which merit the attention of all food manufacturers. These are the Canners' Industry Board emergency price agreement and the Canners' Industry Board reporting agreement. Both agreements were entered into as of Nov. 16, 1937. The reporting agreement is to be in effect until Dec. 31, 1940. The emergency price agreement extends until Aug. 1, 1938, unless terminated earlier by mutual consent.

Each California canner subject to the Canners' Industry Board reporting agreement agrees to fully and correctly report to the managing director of the board such information from its records as may be required regarding quantities, prices and terms of purchases of raw goods involved in the production of canned products manufactured by California canners. Although the canners are exempted from reporting on a few items, most of the fruits and vegetables that constitute the bulk of the California pack are included in the agreement. Data on sales are also included in the reporting agreement. The information required in the report includes date of sale, quantities sold, price, including brokerage and terms of each sale, all contracts of sale, options, cancellations, and all changes made in terms of existing contracts, whether oral or written. From these reports total and average figures will be compiled. The purpose of this data is to determine the average cost of production of each of the items packed by California packers, to establish therefrom the minimum price below which canners will refuse to sell. The cost of this service to members of the association and parties to the agreement is not to exceed 1 cent per case. The penalty for failure to report, or for falsification of report, is placed at $1 for each case unreported or falsely reported and $10 per ton of raw fruits or vegetables purchased for processing and unreported or falsely reported, or at the discretion of the board, a forfeiture of a sum of $1,000. A deposit of $3,000 by each canner participating guarantees the payment of fines.

The Canners' Industry Board emergency price agreement is a joint-selling or market-pool plan which establishes the minimum selling price for the California cling peach pack, below which no member of the plan may quote or sell without being subject to a fine of $1 per case for each case involved in the transaction or a sum of $1,000 at the discretion of the board. A deposit of $3,000 for each member of the agreement guarantees payment of fine. The present minimum price of No. 2½ choice California cling peaches, below which no member of the agreement may quote or sell, is $1.55 per dozen. Future prices will be determined by the cost data resulting from the reporting agreement. At all times 20 per cent of sales will be earmarked as a stabilization fund. Although the agreement covers the 1937 pack and all previous carry-overs, existing contracts for specific quantities are exempt from the terms.

It is the belief of the Canners' Industry Board that these agreements are in harmony with the Miller-Tydings Act, the Clayton Anti-Trust Act, the Robinson-Patman Act and the Federal Trade Commission Act; also with the California statutes, the Cartwright Act, the Unfair Practices Act and the Fair Trade Act. The emergency price agreement does not constitute a monopoly inasmuch as California Packing Co. and Libby, McNeill & Libby, who together control 51 per cent of the California pack, are not parties to the agreement. The minimum price fixed by the agreement is a below-cost price.

Merchandising
HINTS AND HURDLES

How Many More in the Hat?

FOOD DISTRIBUTORS have pulled a surprising number of white rabbits from the hat during the last few years. Crop surpluses that threatened disastrous gluts have moved orderly through food distribution channels to the consumer. Retailers moved an overproduction of canned salmon. They held up a sagging market and moved a surplus of lamb. The grapefruit growers and grapefruit canners may thank the retailers for pulling their chestnuts out of the fire when last year's Florida grapefruit crop was excessive. Milk producers have called on retailers other than grocers to help them create a demand for increased volume of milk. A few months ago when the egg industry, especially in Metropolitan New York, faced the necessity of moving a surplus accumulation of eggs, chains, independent grocers, dairies, restaurants, drug stores, cafeterias, soda fountains, railroads and liquor bars came to the rescue. This year's production is not without its surpluses—California canned cling peaches, canned peas, canned corn, etc. Moving surpluses is a commendable and profitable accomplishment for all involved, but there comes a time when the mightiest magician can pull no more rabbits out of the hat. Moving surpluses may create surpluses of other products produced in normal quantities.

Smaller Discounts For Drop-shipments

IN THE BRILL CO. decision by the Federal Trade Commission the principle is laid down that permissible quantity discounts under the Robinson-Patman law apply only to a given marketing area—not to a large buyer's entire purchases for the whole country. Thus a central buying agency for a nation-wide organization may not be granted a better quantity discount on drop-shipments than a local purchaser of the same quantity in the market to which the drop-shipment is sent.

To get the full quantity discount, therefore, the large buyer must order all the purchases sent to a single destination from which distribution must be made.

Although this may impose hardships on some manufacturers, it goes far to clarify the law and give the independent grocer a better chance than heretofore to compete with the chains.

One Way to End "Stale Returns"

"STALE RETURNS" have long constituted a thorny problem which few bakeries have successfully solved. Retail stores' spoilage losses of meats, vegetables and other produce is a loss that comes out of the retailers' profits. Bread and bakery products, however, are usually handled differently. Fresh bread deliveries are made each day by the bakeries serving a retail outlet. Whatever unsold bread or bakery products are left from the previous day are picked up by the bakery and credited to the retailer's account. Stale returns, which with many bakeries often represent a fair portion of each day's bake, still represent a difficult problem for many bakers. In Louisiana the Supreme Court has held valid a State Board of Health rule which prohibits not only the return of stale bread and bakery products from retailers to the bakery but also from the consumer to the retailer. Although this rule does not apply to packaged goods such as crackers and cookies, boxed and packaged at the bakery, it does apply to wrapped bread and wrapped fresh bakery products. Bakers in other parts of the country hoping to solve the stale-returns problem may well follow the progress of the Louisiana bakeries.

Another Food Product For Grocers

THERE HAS BEEN a growing tendency among ice cream manufacturers to find an increased and more controllable outlet for their products through their own dairy stores. Grocery stores in some parts of the country where these retail dairy stores offer competition, not only in dairy products but also other food staples, have met the competition by putting ice cream cabinets in their own stores. At least one small corporate chain has successfully merchandised packaged ice cream through its retail outlets. Oakley Stores, with headquarters in Terre Haute, Ind., has for three successive years outgrown the capacity of its own ice cream plants, which supply between 40 and 45 of its stores with packaged quarts and pints. Last year's summer demand through these 45 stores was in excess of the plant's capacity of 1,800 gal. per week. Ice cream will find a place for itself with other frozen foods distributed through grocery stores.

Canners Acknowledge Consumers

At the convention of the Canners Association in Chicago last January, resolutions were passed that at last acknowledged the existence of the consumer, as a body politic, powerful, influential and dangerous when misguided and misdirected. The resolution called for the National Canners Association, each state and regional canners association and each member to disseminate authentic information, to the end that the public may have full knowledge of the industry's purposes and policies, the services it performs, and its relations with the growers of canning crops, the labor that the industry employs, the distributing trades to which its goods are marketed, and the consumers who buy its products.

No Royal Road

INDEPENDENT MERCHANTS and others who fostered the Miller-Tidings Act have found no royal road to schackled competition and easy sailing as a result of price-fixing fair trade acts. Their inability to agree among themselves is threatening the effectiveness of organized effort. With favorable state and national legislation, this group has been having its innings. A disposition to rely on legislation without doing much else to retain their gains

makes their present position vulnerable. The opposition is finding ways around the law. In the face of increased Federal Trade Commission activities in connection with vertical arrangements under the Miller-Tidings Act, some of the leaders in the movement are withdrawing. With increased official and public opposition to price maintenance, legislative support is showing signs of disintegrating. There has been scarcely any pressure on the food manufacturer to fix and maintain prices as has been the case in the drug, cosmetic and other fields. In view of present trends the food manufacturer can expect few, if any, complications as a result of the Miller-Tidings Act.

Bellweather for Price Maintenance

The first company to make the plunge into grocery product outlet price-fixing is the Hecker Products Corp., New York. Hecker price maintenance contracts are with wholesalers only and cover at present but two of their products, Gold Dust and Silver Dust. Retail prices are not fixed by manufacturer's agreement. Though both of these products are sold through grocery store outlets, they are not food items. Whether or not the food manufacturers will choose to follow the leader into price-fixing will depend on the degree to which they are willing to disturb the equilibrium that exists between the independents, chains, voluntaries and supermarkets. However, there will probably be considerable watching and waiting on developments of the Hecker Products Corporation experiment.

Loss Leader Evil Persists

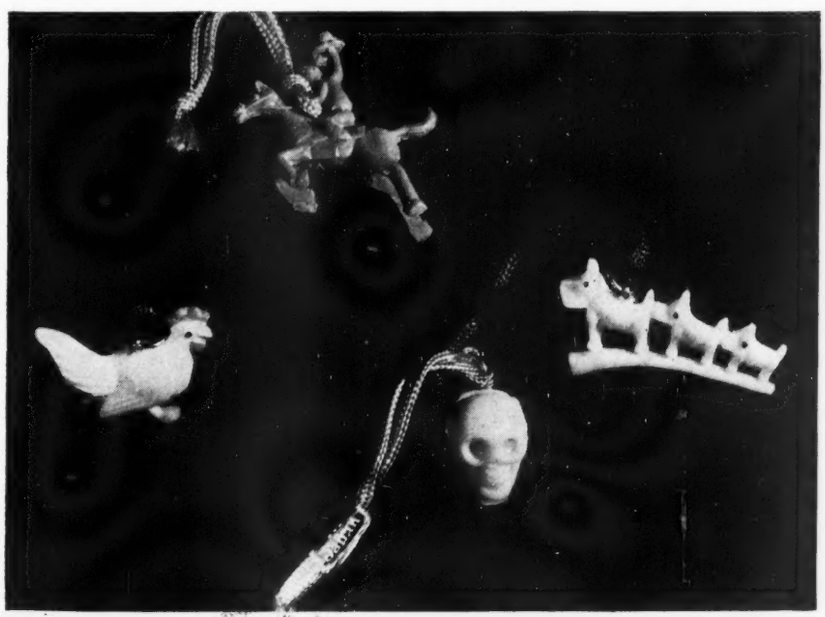
SENATOR TYDINGS, Maryland, in an address before the Canner's Convention in Chicago, in January, discussed loss leader and below cost selling as it affected the manufacturers of trade branded merchandise. He pointed out that manufacturers of trade branded quality merchandise through years of expensive good will building had created a widespread distribution and consumer acceptance for their products. He further pointed out that the quality of these trade branded commodities had been depreciated in the minds of the consumers to such an extent by loss leader selling that consumers had taken it for granted that their quality must have been cheapened. Senator Tydings pointed out that not only had some of these national manufacturers suffered the loss of consumer acceptance and consumer good will, but had even been faced with financial reserves as a result of loss leader selling. He indicated that loss leader selling is still prevalent and encouraged food manufacturers to give greater consideration to the protection they might obtain by taking advantage of the state fair trade laws existing in most states and the leeway afforded them by the Miller-Tydings Bill.

Another Chain Tax Bill Declared Valid

THE SUPREME COURT recently reaffirmed its decision that the Texas chain store tax was valid. The chain's last chance to escape the tax is through a decision by the Supreme Court of the United States. This tax is a graduated tax with $750 the top tax for organizations operating more than 50 stores. One chain is reported to be closing more than 100 of its Texas stores. Wherever the population justifies it, closed units will be replaced by supermarkets. Independent store owners in New York have sponsored a bill to tax corporate chain stores on a graduated scale from $10 to $550 per store. Should this bill be passed in New York State, many of the small units of the corporate food chains will be closed. Supermarkets will replace them. Independents in other states who have fostered chain store legislation have found it more difficult to weather the competition of the supermarket than that of the corporate chain whose merchandising methods the independent has adopted, and whose competition the independent is now able to meet.

Services Benefit Giver as Well as Receiver

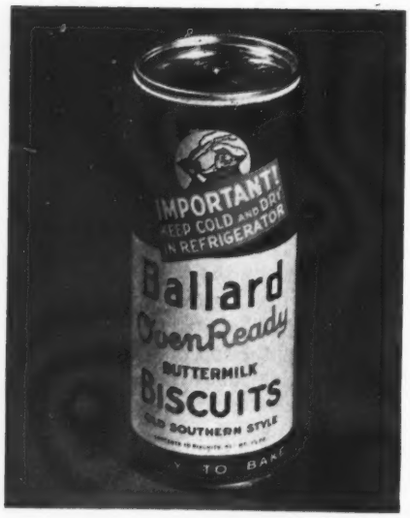
IN THE F.T.C. DECISION ordering A.&P. to cease and desist from accepting brokerage paid to their own salaried buyers by sellers, the commission made a significant observation. Even though it was established that A.&P. aided sellers in many ways, nevertheless, F.T.C. ruled that all services rendered actually promoted the interests of A.&P. alone. This decision was rendered without any attempt to establish the existence of injury to competition.



PREMIUM PLAN GOES AMUCK

A New England bakery obtained a rapid increase in bread sales by placing inside the bread wrapper with each loaf of bread a figurine similar to those pictured. The figurines, made of molded plastic, dangled from gay-colored cords with which children fashioned them into "jewelry." The demand by children for the figures with which to make "charm pendants and friendship bracelets" increased bread sales more than 300 per cent within two months. However, the hand-operated mechanical operation of inserting the figures in each package allowed a few to slip by inspection and reach consumers bearing the label "Made in Japan." Local resentment of Japanese-made products stimulated by competitors' agitation necessitated immediate abandonment of this type of premium merchandising.

New PACKAGES



Sausages Replace Pork in Beans

Crosse & Blackwell, Baltimore, Md., processors of approximately 200 food items, have during the last year added a considerable number of new items to their list of food products. Among the new items recently put on the market is ready-to-serve "Beans with Sausage" in tomato sauce, a departure from the standard item Pork and Beans.

Package Problem Solved

PAST ATTEMPTS to place on the market ready-to-bake biscuit dough have met with indifferent success and oftentimes failure. Fermentation within the container frequently expanded the contents beyond the confines of the container. Ballard & Ballard Co., Louisville, Ky., apparently has solved the ready-to-bake biscuit problem, partly through the use of a novel container and partly as the result of their distribution system. The container is of impregnated fiberboard with metal top and bottom. A small hole in the metal top allows any generated gases to escape. "Oven Ready" buttermilk biscuit dough is further protected by a wax-paper-backed foil wrapper, inside the container. Instructions on the container caution the housewife to keep dry in the refrigerator and not open until the oven is hot and ready to receive the biscuits. The package is opened by cutting in the center along an indicated dotted line with a sharp knife. Ballard's oven-ready biscuits are distributed through outlets with refrigerated show-cases, for the product is kept under refrigeration until sold. The product is not a shelf item but a refrigerated showcase item.

Nickel Size Hazelnut Bar

PETER CAILLER KOHLER Swiss Chocolates Co., Fulton, N. Y., has for years offered to the trade "Nestles 5½ oz. Hazelnut Milk Chocolate", a bar selling popularly at 15 cents or two for 25 cents. The hazelnut bar is now reaching the market in a nickel-seller size.

Package for the Mass Market

"CORN-CHIPS" product of Toasto Foods, Inc., Cincinnati, Ohio, a new product that was introduced to the market early last year in attractive white lithographed 1-lb. and ½-lb. cans, (FOOD INDUSTRIES, May, 1937) was at that time packaged to be distributed through retail outlets in the better class neighborhoods. Corn-Chips are made from whole grains of white corn processed into crisp and crunchy ribbons. The product is now obtaining distribution through supermarkets and other rapid turn-over outlets, packaged in 6 oz. amber-colored wax-paper bags. The bags are made of two layers of overlapping paper waxed together.

New Three Purpose Package

IN ORDER TO INCREASE the number of packaged whole spices which the housewife can carry in regular stock on the pantry shelf, The McCormick Sales Co., Baltimore, Md., has repackaged more than 30 varieties of whole spice in white, lithographed tin cans with a slip-over cover. This new container is an improvement over the former cardboard carton in that it preserves the contents better, increases the eye appeal by the use of a more attractive package and improves the stacking qualities of the package on the dealer's shelves. Another advantage has been gained by the new container. The name of the spice contained in the can is prominently displayed on the can's narrow side. This permits the housewife to save shelf space by stacking the containers sidewise. The new package is a mem-

AND PRODUCTS

ber of a family group and retains the family identity.

Kentucky Salt Fish Packer

IN LOUISVILLE, KY., the Bob Kelley Food Products Co., is processing, packaging and distributing fish and oysters shipped to it fresh from the Fish Pier in Boston. Fillets of haddock are cut into the correct portions for serving, breaded and packaged in paperboard containers (four portions to the container) ready for distribution. Oysters, also breaded, are packaged (six to the box) ready for the frying pan. Distribution of these two products has reached a volume of two carloads per week.

Adds Name with Label Change

WITH a recent change of label the Borden Company, New York, has adopted the trade name "Eagle Brand Magic Milk" for its canned sweetened condensed milk. The new brilliant red label has an eye appeal that will stimulate impulse sales. Pasted on top of the can is a small circular booklet containing eight recipes for pastry and confections requiring condensed milk as an ingredient. The increased eye appeal of the new label and the silent salesman booklet attached to the top of the can are both in step with the trend to recreate packages to conform with the merchandising demands of the self-service store.

New Tone for Old Standby

NOT FOR MANY YEARS has there been any change in catsup other than a shift from the traditional bottle to a bottle with larger opening and tapered from base to mouth. Now E. J. Ritter Co., Bridgeton, N. J., is offering to the trade a tabasco flavored catsup.

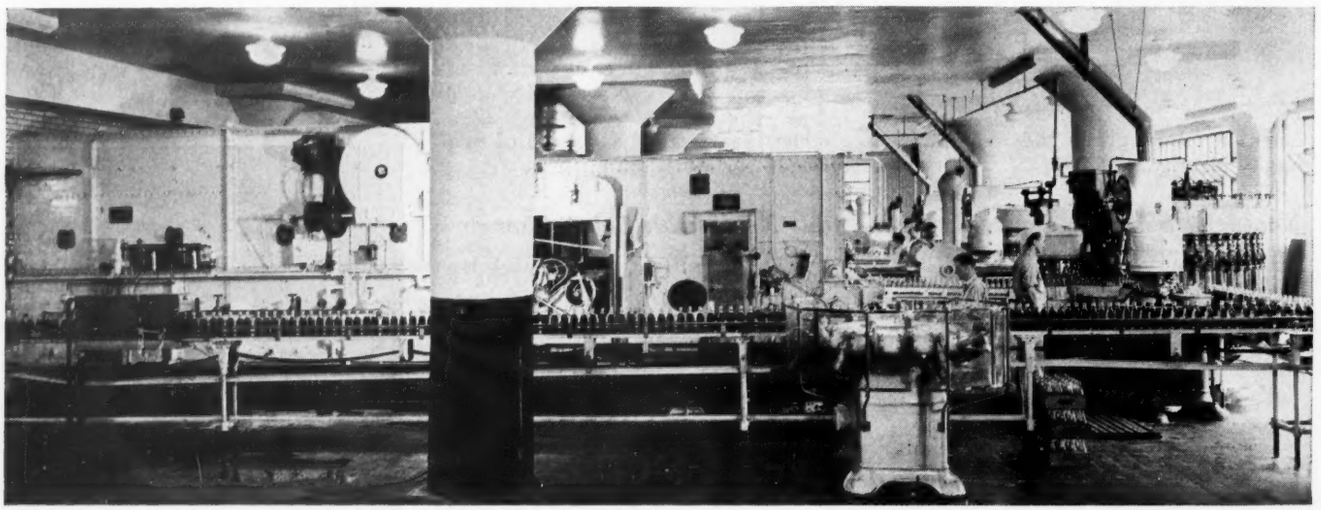
TYPE of TRUCK Important In Beverage Distribution

Bottler finds cab-over-engine chassis with shelf body efficient

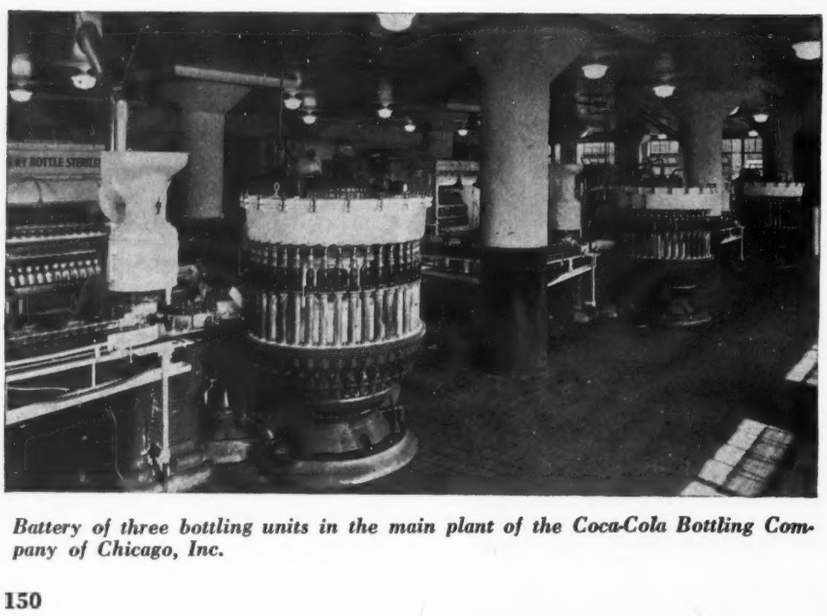
TRUCKS are playing an increasingly important part in the successful merchandising of food products. There was a time when they were the last factor considered after all other phases of the merchandising plan were completed.

But today, they are more often considered first because of the rising labor costs of distribution and the need for covering larger territories in order to increase the sales volume. Hence, the experience of the Coco-Cola Bottling Company of Chicago, Inc., will be of interest to food distributors throughout the country.

The problem which that company's trucks had to solve was the efficient distribution of the maximum output of approximately 700,000 bottles of Coca-Cola a day to 30,000 outlets within a radius of 50 miles of Chicago. The company's latest purchases of truck equipment for the task have been International cab-over-engine models with all-steel, open-top, deck-type bodies. The reasons behind the selection of the cab-over-engine models were the same as the inherent advantages of this type of truck over the more conventional engine-under-hood design.

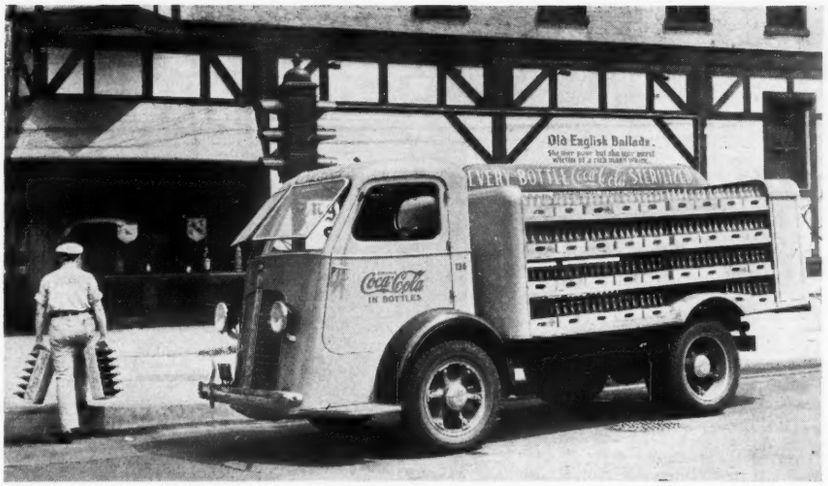


The delivery end of one of the production units in operation at the main plant of the Coca-Cola Bottling Company of Chicago, Inc. A battery of three bottling machines may be seen in the right background. Exclusive of contemplated expansion, the company's 24-hour production capacity is 28,800 cases of 24 bottles each, or 691,200 bottles a day. Each production line is entirely automatic and washes, sterilizes, fills, caps and counts the bottles.



Battery of three bottling units in the main plant of the Coca-Cola Bottling Company of Chicago, Inc.

These advantages include a shorter overall length on a given wheel base, which conserves garage space; a more favorable distribution of gross load and pay load, with consequent longer tire life and more even brake wear; greater ease in parking in crowded streets and greater maneuverability in heavy traffic. In addition, more trucks, when loaded from the side, can be lined up alongside a loading platform of a given length, because of the truck's shorter overall length.



One of cab-over-engine Internationals of Coca-Cola Bottling Company of Chicago, Inc. Note front-end construction, low step at cab and type of body. The latter's shelf arrangement protects the bottle caps and tends to reduce bottle breakage, yet leaves load free for quick loading or unloading from either side.

of the few instances where the height of the driver is important.

To service the company's 30,000 outlets from one to six times a week, a large sales force, consisting of the driver salesmen and special salesmen, is employed, along with a fleet of 114 trucks. In addition to warehouses at the two Chicago plants, reserve stock is carried at strategically located warehouses in Waukegan, Elgin, Aurora, Joliet and Chicago Heights. In the peak seasons, supply trucks replenish the stocks of the regular trucks on the longer routes.

The regular routes vary from 20 miles per day in the loop area to nearly 100 miles in the outside suburban territory. All the trucks are inspected, greased and washed once a week. This is roughly equivalent to complete servicing every 400 to 500 miles.

One of the cab-over-engine trucks backed up to a Chicago factory to replenish the supply of Coca-Cola in the electrically operated, coin-controlled coolers utilized to increase industrial sales of Coca-Cola.

The greater ease with which the driver salesman gets in and out of the cab at each stop also helps to speed up deliveries. This in turn tends to increase the number of stops per day and the total volume delivered.

The special body design also tends to speed up deliveries. As shown in two of the accompanying illustrations, the body is made up of four horizontal shelves, open at both sides. These shelves are placed a sufficient distance apart, one above the other, to admit the wooden cases, each holding 24 bottles of Coco-Cola. By this arrangement, each row of cases is supported directly by the shelf on which it rests. As the bottles extend up above the top edges of the cases, the caps are protected and bottle breakage and loss of beverage lessened.

The cases are loaded four crosswise and nine lengthwise of the body on the three upper shelves, and seven lengthwise on the bottom shelf; the rear fenders curve up into the bottom shelf, reducing the space for cases. This gives a total load capacity of 136 cases on a chassis with a 99-in. wheelbase, and 170 cases are carried on the 117-in.-wheelbase units.

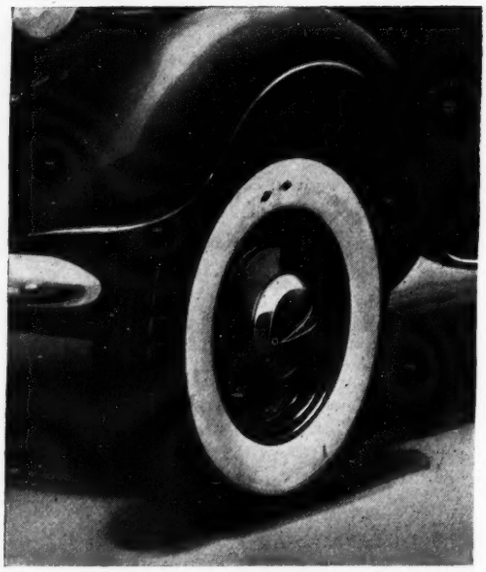
The lowest shelf, or the floor proper of the body, is set directly on top of the chassis frame. This permits the cases on the top shelf to be reached by the driver salesman when standing on the street or sidewalk. To insure that the driver will be able to reach the cases on the top shelf without climbing up on the body, it is preferable to employ drivers of not under 5 ft. 10 in. in height. This is one

Truck servicing is done at the company's own garage and shop. All maintenance work is done at night to reduce the number of trucks out of service during the day to a minimum. A day emergency crew is employed to handle troubles on the routes, although the strict weekly servicing has greatly curtailed daytime road calls.

The truck salesmen attend weekly meetings at which truck safety, road courtesy and sales aids are discussed. In its attempt to fill the valleys in the consumption curve, the company's merchandising plans have emphasized the sale of the six-bottle carton for home consumption; and the use of electrically operated, coin-controlled coolers in factories and offices has proved to be effective for increased industrial sales.

Getting the Most out of Tires

Things to consider in buying and using them



THE FACT that tire manufacturers are today turning out a product that wears exceptionally well does not mean that the tire problems of the motor-vehicle operator are solved. Many things must be taken into consideration in determining the proper type and size of tire for a particular duty, and certain practices must be followed after the tire is put into service if it is to give a maximum of wear. These factors are discussed by fleet operators in the following symposium.

Heavy-duty Tires Best

We find it best to equip our trucks with tires which are rated for the maximum load that will be carried. We use oversize tires because we find them more economical, and we also use heavy-duty casings, with regular-weight tubes. The tires on our vehicles are checked twice weekly to insure proper inflation. We do not make it a practice to change tires from one wheel to another, and do not believe it pays to retread tires used on trucks.—J. L. HARRISON, *Tilghman Canning & Packing Co., Tilghman, Md.*

Checks Tires Frequently

In determining tire capacity, we find it is best to take into consideration the weight of the vehicle plus its load, selecting tires which are rated to carry the maximum load. Oversize tires give more economical and satisfactory service than standard-size tires, but ease of steering is a factor which must be considered. We also believe that it pays to use heavy-duty casings as well as heavy-duty tubes.

To insure proper tire inflation at all times, we resort to frequent checking at definitely stated periods. In fact, this is part of our regular truck-maintenance system. With our system, a report is made out at the close of business each day by the driver of each truck, and on Saturday of each week by the operator of each salesman's car. This report covers tires, lights, brakes, clutch, starting, engine, transmission, rear axle, oil, lubrication, radiator, rattles, etc.

We do not change tires from one wheel to another after they have operated a certain mileage because the tire size on the front wheels of most of our trucks differs from that of the tires on the rear.

When tires are worn smooth, we have found it practical and economical to resort to regrooving and retreading.—L. F. WITZEMAN, *secretary-treasurer, Flock Brewing Co., Williamsport, Pa.*

Uses Maximum-ply Casings

The combined weight of the vehicle and its load should be used in computing tire capacity for trucks. And the maximum load should be used in figuring tire sizes if long and economical service is desired.

Rather than equipping our vehicles with oversize tires, we find it more economical and satisfactory to use standard sizes with the maximum number of plies.

By way of preventing the damage which results from operating motor vehicles with low tires, we check pressure at regular intervals. Once a year we change tires from one wheel to another. When tires are worn smooth, we do not believe that it pays to regroove or retread them.—ROBERT S. THORNE, *assistant treasurer, Geneva Preserving Co., Geneva, N. Y.*

Believes Regrooving Pays

In equipping trucks with tires, we think it best to compute the tire capacity on the basis of the total weight of the vehicle and its load, taking into consideration the maximum load.

The most economical and satisfactory service on trucks and commercial cars is attained with extra-ply, standard-size tires, using heavy-duty casings and heavy-duty tubes.

To insure proper tire inflation at all times, we have the tires checked weekly. We do not change tires from one wheel to another, but we place the best tires on the rear in winter and on front in summer.

Our experience indicates that it pays to regroove tires if they are not too far gone.—LES J. SHAFFER, *Shaffer Ice Cream Co., St. Marys, Pa.*

Prefers Oversize Tires

We have depended upon the recommendations of the truck manufacturers in reference to tire equipment. Where a choice has been given, we have had the most satisfactory results with the use of oversize tires rather than the standard size. We have found that we obtain very good mileage from any tires made by the large, responsible manufacturers. In fact, the number of miles which the modern tire will travel is astonishing.

We have not had sufficient experience with retreading to give any valuable information. We have some retreaded tires in operation now, but my personal opinion is that when the tires are worn smooth, it is more economical to purchase new equipment.—STUART K. FARRAR, *Comstock Canning Corp., Newark, N. Y.*

Distribution QUESTIONS CLUB

Statistics Show Shifts in

CHANNELS OF DISTRIBUTION

This is the second of a series of articles showing probable effect of frozen foods on food distribution

This record of the changes made by manufacturers in the selection of distribution outlets forms a basis on which the effects of wide-scale distribution on frozen foods may be judged.

By IVAN C. MILLER
Distribution Editor

THE BASIC CHANGES during the recent years which have occurred within the food processing industry, as revealed by statistics compiled by the Department of Commerce, were discussed in the February issue of FOOD INDUSTRIES. This article will discuss the changes in the channels of food distribution during the same period of time.

Food manufacturers' sales for 1935 were 13.7 per cent below 1929. Retail food sales were off 22.8 per cent. Grocery wholesalers and jobbers did not approach so near the 1929 level. The reason why wholesalers' and jobbers' sales were off more than manufacturers' and retailers' is at least partially accounted for in Table I, which indicates the many changes made during a six-year period by food manufacturers in the channels they chose for the distribution of their products. The summary for all food and kindred products indicates that the food manufacturers were depending less upon wholesalers and jobbers for the distribution of their products than upon other channels of distribution. During the years covered by the data, food manufacturers increased the per-

(*Turn to page 156*)

Table I—Distribution of Food Manufacturers' Sales—1925-35.
Per cent to each type of Outlet

	Own wholesale		Branches		Industrial, etc.		Wholesale and jobber		Own retail outlets		Chains and independent retailers		Household consumers	
	1929	1935	1929	1935	1929	1935	1929	1935	1929	1935	1929	1935	1929	1935
Beverages, carbonated	3.9	3.4	2.4	1.0	26.3	10.3	1.5	1.1	61.4	82.7	4.5	1.5
Bakery products, other than biscuits, etc.	3.4	2.5	3.1	1.7	7.4	4.7	11.1	16.1	50.8	51.5	25.2	23.5
Biscuits and crackers	53.4	40.4	0.4	1.6	8.4	14.1	3.0	0.2	34.6	42.9	0.2	0.8
Butter	22.5	19.2	2.6	5.0	39.6	35.9	2.3	1.6	22.8	30.5	10.2	7.8
Fruits and vegetables, canned and dried	16.3	27.2	4.0	2.2	67.6	58.1	2.3	0.5	9.5	11.9	0.3	0.1
Fish, canned and preserved	....	17.6	....	2.2	....	64.4	....	....	....	15.7	....	0.1
Cereal preparations	....	24.7	....	1.7	....	28.5	....	....	....	44.6	....	0.5
Cheese	....	16.4	....	2.5	....	67.9	....	1.2	....	8.6	....	3.4
Confectionery	4.8	3.9	1.3	1.2	54.4	55.1	9.2	7.7	26.8	29.3	3.5	2.8
Flour, etc.	7.7	17.5	23.5	20.8	40.3	34.7	1.4	1.4	27.1	23.1	....	2.5
Ice cream	10.4	7.1	2.9	2.5	10.6	7.7	4.7	11.5	60.4	59.4	11.0	11.8
Meat products	46.9	37.4	3.1	3.8	17.8	17.4	1.0	0.8	30.6	40.3	0.6	0.3
Chewing gum	....	....	0.2	....	86.1	92.4	....	....	13.7	7.6	....	....
Chocolate, cocoa	....	5.8	19.6	17.9	66.0	59.6	....	....	14.4	16.7	....	....
Condensed and evaporated milk	35.9	36.5	6.0	11.5	42.4	34.3	6.0	2.0	6.5	13.3	3.2	2.4
Corn syrup	....	....	43.8	41.7	55.0	57.7	....	....	1.2	0.6	....	....
Flavoring extract	8.0	12.5	9.9	20.4	62.7	37.3	3.8	4.5	13.9	23.7	1.7	1.6
Macaroni etc.	3.1	5.5	6.7	3.7	54.0	50.7	....	3.4	34.6	35.4	1.6	1.3
Malt	....	....	43.8	99.0	23.1	.8	....	....	23.1	0.2	....	....
Oleomargarine	12.5	10.8	2.3	6.7	43.3	65.0	....	....	31.9	17.2	....	0.3
Poultry, dressed	33.2	37.9	2.9	8.2	47.3	36.4	1.0	0.3	14.2	16.3	1.4	0.9
Rice, cleaned and polished	3.9	9.1	5.9	1.5	90.2	88.4	....	....	1.0	....	....	....
Sausage	6.0	27.6	3.6	4.9	24.5	16.3	2.8	4.3	59.6	44.2	3.5	2.7
Shortening, etc.	78.9	55.1	6.1	15.2	13.6	23.6	....	....	1.4	6.1	....	....
Sugar beets	....	....	6.1	11.3	93.9	81.4	....	....	....	6.9	....	....
Sugar cane	....	....	55.9	76.3	43.9	22.1	....	0.4	0.2	1.1	....	0.1
Sugar cane refined	26.1	24.9	8.5	14.3	53.3	46.5	....	....	12.1	14.3	....	....
Vinegar and cider	2.8	1.5	10.6	3.5	71.5	80.5	1.1	....	12.9	14.2	1.1	0.3
All food and kindred products	24.6	21.5	6.9	7.9	31.6	28.5	3.2	3.8	29.2	33.2	4.5	5.1

Will *Your Product* be

REPRODUCED HERE, are food pages which will appear in the forthcoming April issues of five women's magazines. If your product is featured in one of these, display posters bearing reprints of the pages will boost sales of your product in retail outlets where they are used.

It was because of the sales stimulation of point-of-sale posters made from reprints of the women's magazines' food pages, determined by tests conducted with both independent and group retail organizations by FOOD INDUSTRIES, and because of retailers' continued willingness to use this type of display poster that FOOD INDUSTRIES arranged with the women's magazines to obtain advanced proofs of these pages. The purpose of obtaining these advanced proofs is to describe and illustrate the forthcoming food pages of the women's magazines so that manufacturers whose product or products are among those featured may obtain ready-for-use posters bearing reprints of the food pages and place them in the hands of the retailers at or about the same time the magazines reach their readers.

Mounted reprints of these food pages (single pages on 14x22 in. poster board, spreads on 28x22 in. poster board) may be obtained from the magazine ready for use at the following prices:

SINGLE PAGE

1,000 to 1,999 inclusive	15c
2,000 to 2,999 "	12c
3,000 and over	10c

TWO-PAGE SPREAD

1,000 to 1,999 inclusive	25c
2,000 to 2,999 "	18c
3,000 and over	16c

1—WOMAN'S HOME COMPANION: Full color spread suitable for the promotion of tea, bread, lemons and spices.

2—GOOD HOUSEKEEPING: Full color spread suitable for the promotion of coffee.

3—MCCALLS: Full color spread suitable for promotion of eggs and Easter egg colors.

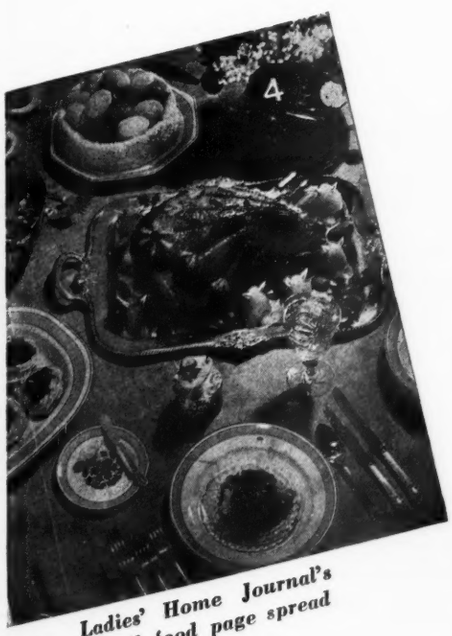
4—LADIES' HOME JOURNAL: Full color spread suitable for the promotion of ham, canned peas, tomato juice, eggs and ice cream.

5—PICTORIAL REVIEW-DELINEATOR: Two color spread featuring deep fat frying. Suitable for promotion of lard, shortening and doughnut ingredients.

Featured in April by one of the Women's Magazines?

Manufacturers may either correspond with any one of the magazines direct, if interested in food pages appropriate for their products or write to the distribution editor of FOOD INDUSTRIES.

Each poster will carry the printed line "As seen in the March issue of . . . . . Magazine." The manufacturer's own selection of caption or "selling slug" such as "Try these recipes suggested by *Pictorial Review-Delineator*," "Try these bread novelties made with dried fruit," "A dessert that gives the festive touch," etc., will be printed at the top of the poster. No poster will bear the name of the manufacturer or his trade brand.

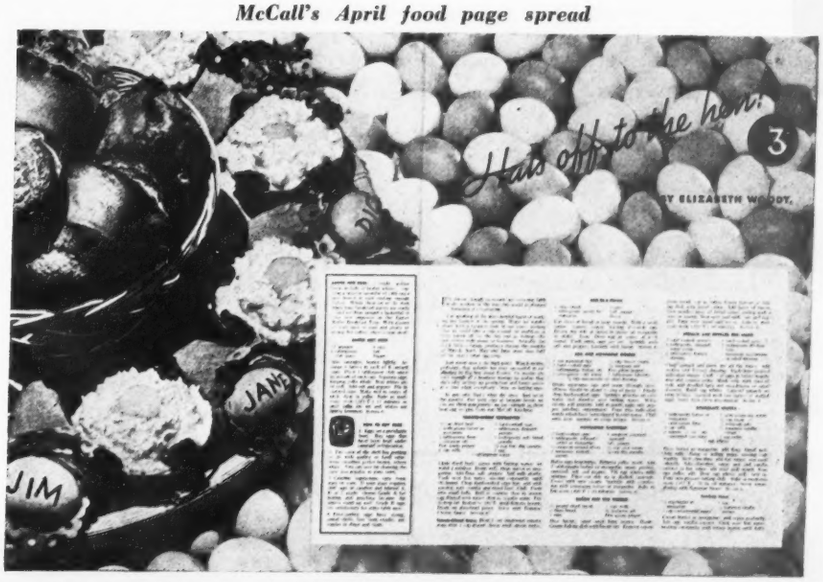


Ladies' Home Journal's April food page spread

Woman's Home Companion's April food page spread

Good Housekeeping's April food page spread

McCall's April food page spread



centage of their products sold to retailers direct, the percentage of their products sold through their own outlets and the percentage sold direct to household consumers. Table I indicates considerable shifting by manufacturers from one distribution channel to another. Some have greatly increased the percentage of their sales direct to retailers. Others have curtailed this means of distribution. One very important indication of a trend is the increased distribution of ice cream through manufacturer-owned outlets. The table indicates that an increasing number of ice cream manufacturers are turning to their own dairy stores as the most satisfactory outlets for their products. Table II, which reports on those manufacturers who sell through their own retail outlets, indicates that in 1935, 590 ice cream manufacturers, or 24 per cent of them, sold at least a portion of their output through their own retail outlets. Two hundred ice cream manufacturers, 8 per cent, sold exclusively through their own retail outlets.

Of the 47,992 food manufacturing plants recorded in the 1935 Census of Manufactures, 28,599, or approximately 60 per cent of them, depended exclusively on one channel of distribution. Table III records the number of food manufacturers using each type of food distributing channel; also the number that use each type of channel exclusively.

Manufacturers who obtain their distribution partially through wholesalers and jobbers and those who obtain their entire distribution through those distribution channels are shown in Table IV. Table V tabulates those food manufacturers who either sold their entire output or a portion of it directly to retail outlets. Table VI gives a picture of a distribution direct to household consumers.

Food processing, including packaging, has changed with the years to conform with the changing pattern of distribution. Distribution methods shift with the changes in manufacturing.

Last summer during the "R-less" months, fresh Atlantic Coast oysters were served in Pacific Coast "stool restaurants" at 50 cents per dozen. In the Middlewest, farmers have been paying the dentist with frozen food which the dentist holds for future use in his own low-temperature locker in a cold-storage plant. Last year, old established institutions called for the first time on the retail grocery trade to sell the trade frozen foods. These are a few of the effects resulting from the increased distribution and use of frozen foods. Frozen foods, which have had a noticeable influence on both the manufacturing and distribution of foods in recent years, promise to influence both manufacturing and distribution to a much greater extent in the future. Frozen foods promise to bring about more changes than have occurred in many years. The extent of this influence and the resultant changes will be discussed in the April issue of FOOD INDUSTRIES.

Table II—Manufacturers Who Sell Through Owned Retail Outlets.

Type of manufactiring establishment	Together with other channels	Exclusively	Total establishments
Bakery products, other than biscuits and crackers	3,983	1,913	18,821
Confectionery	274	154	1,293
Ice cream	590	200	2,465
Meat packing	119	9	1,210

Table III—Channels of Distribution Used by Food Manufacturing Establishments.

Channel of distribution	Number of food manufacturing establishments using each channel of distribution	Number using each type exclusively
Own wholesale branches	2,229	908
Industrial users	4,452	641
Wholesalers and jobbers	14,672	5,948
Own retail branches	5,831	2,522
Retailers	23,419	8,472
Household consumers	20,758	9,201
Agents, etc.	4,379	1,412
Total	.....	28,599

Table IV—Manufacturers Who Use Wholesalers and Jobbers.

Type of manufacturing establishment	With other channels of distribution	Exclusively	Total establishments
Beverages, non-alcoholic	327	86	3,014
Bakery products, other than biscuits and crackers	1,275	235	18,821
Biscuits and crackers	161	41	334
Butter	2,082	299	3,408
Canned and dried fruits and vegetables	2,051	1,440	2,659
Canned and preserved fish	210	145	269
Cereal preparations	73	41	110
Cheese	2,241	1,803	2,575
Confectionery	644	227	1,293
Flour and other grain mill products	866	136	2,076
Ice cream	319	73	2,465
Liquor, malt	482	94	663
Liquor, vinous	154	75	264
Meat packing	445	80	1,210
Condensed and evaporated milk	155	.....	422
Flavoring extracts	200	.....	408
Macaroni, etc.	169	.....	336
Poultry	227	.....	552
Sausage	186	.....	764

Table V—Manufacturers Who Sell Direct to Retailers, including Chains.

Type of manufacturing establishment	Together with other channels	Exclusively	Total establishments
Beverages, non-alcoholic	2,816	2,289	3,014
Bakery products, other than biscuits and crackers	7,961	2,524	18,821
Biscuits and crackers	226	91	334
Butter	2,303	322	3,408
Canned and dried fruits and vegetables	653	179	2,659
Canned and preserved fish	74	20	269
Cereal preparations	48	13	110
Cheese	248	51	2,575
Confectionery	694	209	1,293
Flour and grain mill products	1,452	365	2,076
Ice cream	1,590	585	2,465
Liquor, malt	491	91	663
Meat packing	952	417	1,210

Table VI—Manufacturers Who Sell Direct to Consumers.

Type of manufacturing establishment	Together with other channels of distribution	Exclusively	Total establishments
Beverages, non-alcoholic	344	33	3,014
Bakery products, other than biscuits and crackers	12,070	7,452	18,821
Biscuits and crackers	48	10	334
Butter	1,889	39	3,408
Cheese	245	8	2,575
Confectionery	244	136	1,293
Flour and grain mill products	936	114	2,076
Ice cream	1,093	340	2,465
Meat packing	275	10	1,210

New DISCOVERIES AND INVENTIONS

FOOD ENGINEERING

Calculating Refrigeration Requirements in Beer Storage

THE REDUCTION of the beer temperature in storage cellars by 1 deg. C. per day per hl. (0.85 bbl.) necessitates the removal of 24 calories for 30 days storage, 12 calories for 60 days storage and 8 calories for 90 days storage. The differences in the demand for refrigeration are accounted for by the gradually diminishing production of heat during the after-fermentation. To the foregoing total heat removal must be added 500 calories for "working heat" (1 man per 2,000 hl. of cellar space), plus 4,500 calories for cooling the wash water plus 1,000 calories for the heat produced by lighting per day. The type and construction material of the storage tanks affects both the capacity and the refrigeration requirements.

In a cellar (14x16x6 m) permitting the storage of 4,435 hl. of beer in wood, 8,870 hl. in metal or 11,827 hl. in concrete tanks, the refrigeration requirements are given as 40, 25 and 21 calories respectively per hl. beer for 60 days storage, or 795, 990 and 1,110 calories per sq. meter of floor surface. The daily cold consumption per hl. in calories is calculated by dividing the constant 100 (100-per cent insulation) by the number of weeks of storage plus the sum of all absorption surfaces, divided by five times the number of hl. in thousands. All calculations are based on an arbitrary "volume surface" which is defined by the absorption surface of 1 hl. beer, multiplied by the difference between the mean daytime temperature and the cellar temperature. Where there is insufficient insulation, the surfaces must be divided by the percentage of insulation. Walls between cellars may be neglected and ground floors are divided by three.

Digest from "Cold Consumption and Insulation in Beer Storage Cellars," by J. F. Buchi, *Schweizer Brauerei-Rundschau* 48, 33, 1937. (Published in Switzerland.)

BAKING

Bread Dough Degassed During Proofing

CLOSE GRAINED and fine textured loaves result when bread dough is degassed by a gentle kneading action during proofing is the claim made in U. S. Patent No. 2,104,282 granted Jan. 4 to Carnot R. Wagener and Albert J. Faulhaber, Cincinnati, Ohio.

The dough is divided and rounded in the regular manner, then passed through an overhead multi-belt proofer for a brief fermentation and resting period usual in standard practice.

In the new procedure these proofed balls of dough are picked up, after discharge from the proofer, by two over-lying elevator belts operating against the faces of staggered idlers. These idlers maintain a tension on the elevating belts so as to hold the ball of dough in place on the belts and to impart to the ball of dough a rolling and kneading pressure for the expulsion of the gas held by the dough.

From these elevating belts the dough balls are discharged onto the half of the wide proofer belts not used in the first proofing. Following this second passage through the proofer, the dough balls go to the molder.

Special Salt for Baking

AN IMPROVED BAKING SALT, particularly characterized by the absence of free ammonia, is made by mixing common salt (sodium chloride) with not more than 10 per cent of its weight of an ammonium compound or a mixture of ammonium compounds. The purpose of this admixture, as described in British Patent 468,468 (granted Sept. 30, 1937, to L. and E. Elion, The Hague, Holland) is to neutralize any free alkali with which the salt may be contaminated. The neutralization reaction liberates ammonia, which must not be presented in the product. A fixative for the free ammonia is therefore added, e.g., 0.1 to 0.5 per cent of a substance with acid reaction. This may be an acid phosphate (or pyro-phosphate), a persulphate or an organic acid such as tartaric or citric acid. It may be incorporated with the salt, or with the ammonium compound, before admixture.

If it is preferred not to add a fixative for the liberated ammonia, a physical method of removal may be employed, e.g., solutions of salt and the ammonium compound may be mixed and evaporated to dryness. Another expedient is to mix the dry substances and carry off the liberated ammonia by means of an air current. Baking salt prepared in this way is good for use in place of all or part of the ordinary salt.

BEVERAGES

Air Affects Beer Flavor and Stability

OFF-FLAVORS, as well as chemical and biological turbidities, in beer may be due to the presence of excess quantities of air. Pasteur long ago recognized that in addition to the oxygen consumption in yeast metabolism, oxidation reactions take place which transform the wort constituents. Whereas the former is indispensable for yeast growth, the latter may change their composition and physical properties in such a manner as to impair the appearance and taste of the beer. Partly oxidized degradation products of proteolysis and starch hydrolysis, together with tannins and hop resins are likely to utilize the free oxygen absorbed in the wort or beer for further oxidation. This process is hastened by pasteurization. The use of CO^2 instead of air for counter-pressure in packaging minimizes turbidity formation from this cause.

Digest from "Air Affects Beer Flavor and Stability," by M. Van Laer, *Petit Journal du Brasseur* 44, 998, 1936. (Published in Belgium.)

CANNING, PRESERVING

Effect of Temperature On Tomato Juice

IN MAKING TOMATO JUICE CONCENTRATES it has been found that moder-

ate heat not only does not destroy the antiscorbutic potency but actually preserves it better than a lower processing temperature. The actual optimum temperature is about 60 to 70 deg. C.. (140 to 158 deg. F.) because at higher figures (beyond 80 deg. C. or 176 deg. F.) deterioration by heat sets in. By actual measurement, the loss in antiscorbutic potency is only from about 2 to about 10 per cent in the optimum temperature range, whereas at lower temperatures, say 20 to 40 deg. C. (68 to 104 deg. F.), the loss is very large. Evidently, the principal cause of deterioration is oxidation by atmospheric oxygen, and the fact that higher temperatures accelerate oxidation is more than offset by two factors tending to oppose the reaction as the temperature rises. One is the lower solubility of oxygen gas in the heated liquid. The escape of dissolved oxygen lowers the concentration in the liquid and so lessens the rate of oxidation. The other protective factor is the increased vaporization of water from the liquid as the temperature rises. By displacing air from above the liquid, the vapor also displaces oxygen, and again the rate of oxidation is lessened. But as the temperature continues to rise, these two protective effects reach a maximum (optimum temperature) and begin to diminish because of the increasing intensity of heat. Minor factors in improving the quality of the concentrates are mechanical seed removal (better color and flavor), and preparation in enameled iron and stoneware instead of in copperware to prevent discoloration and other effects of copper.

Digest from "Modern Italian Research on Food Preservation," by Franco Emanuele, *L'Industria Italiana delle Conserve Alimentari*, 12, 137 (1937). (Published in Italy.)

DAIRY PRODUCTS

Storage Time and Temperature and Cream Grades

SAMPLES OF FIRST-GRADE CHURNING CREAM were held at temperatures varied by 5-deg. intervals between 50 deg. and 90 deg. F. up to sixteen days. Under these conditions the cream dropped to second grade in from eleven to sixteen days at 50 deg., while at 90 deg. only one to four days were needed. It became third grade (unlawful cream) in three to five days at 90 deg. but was still second grade at 50 deg. after sixteen days.

Temperature played an important part in the type of flavor developing. Of course, souring was more rapid as the temperature increased. Stale flavors were more common at low temperatures. Cheesy and yeasty flavors appeared only at the higher temperatures. Putrid flavors appeared at high and low, but not at intermediate, temperatures. Rancidity was absent at 50 to 55 deg. Protein decomposition was greater in poor cream than in good.

Digest from "The Effect of Temperature and Time of Storage of Cream on the Rate and Type of Deterioration," by W. H. Martin, A. C. Fay and W. J. Caulfield, *Journal of Dairy Science*, 20, 667, 1937.

Bad Tilsit Cheese from Silage Milk

IN CONTRAST with favorable results obtained in previous tests, milk from cows fed with silage containing 0.37 to 0.79 per cent of butyric acid gave severely blown cheese, poor in texture. Evidently, after-warming to 46–48 deg. C., which offers ideal conditions for the butyric acid bacillus, is responsible. Silage feeding was followed by an enormous increase in the count of lactate-fermenting butyric acid bacilli in the feces of the cows (a better test than chemical examination of the silage). The milk of silage-fed cows shows long persisting changes in bacterial flora, with heavy predominance of lactic acid organisms (including streptococci) in the cheese, and a much smaller count of caseolytic organisms. In spite of this, there was only one instance of retarded ripening of the cheese. Presumably, the lactic-acid organisms are capable, under certain conditions, of replacing the acidoproteolytic organisms in their ripening action. At any rate, they are indispensable to the development of flavor.

Digest from "Mycology of Tilsit Cheese; Cheese Making From Silage Milk," by Johannes Rodenkirchen, *Milchwirtschaftliche Forschungen*, 19, 23, 1937. (Published in Germany.)

FATS & OILS

Phosphorous Acid Retards Rancidity

COTTONSEED, peanut, soya, corn and general salad oils and shortenings including lard are stabilized against rancidity when treated with phosphorous acid or its acid derivatives according to U.S. Patent No. 2,104,242.

The preferred form of these antioxidants is a simple salt such as Ca $(H_2PO_3)_2$ or NaH_2PO_3 used in concentrations of 0.0001 to 0.01 per cent as phosphorous anhydride.

Ability to resist development of rancidity is almost doubled in oils to which 0.001 per cent of 50 per cent phosphorous acid has been added; 0.002 per cent of acid retards rancidity development still further. Vegetable cooking oils containing about one part per million of copper, a rancidity catalyst, had their rancidity-resistance factor increased 50 per cent by the addition of 0.05 per cent by weight of a 52 per cent solution of NaH_2PO_3. Addition of 0.1 per cent of the acid phosphite tripled the rancidity-resistance factor of the oils.

This stabilizing power is claimed for those acids and acid-reacting derivatives containing stably-bound oxygen given in U.S. Patent No. 1,993,-181 granted March 5, 1935 to Richardson, Vibrans, and Andrews.

While this method of stabilizing fats and oils is effective when applied to the finishing product during cooling after steam deodorization, it is also effective for treating oils and fats which are exposed to air during factory storage and handling. Antioxidant may be removed by alkali refining or water washing before the oil is finally processed.

The patent was granted to Albert S. Richardson, Wyoming, Ohio; assigne Procter & Gamble Co., Cincinnati, Ohio.

MEATS

Artificial Sausage Casings That Look Natural

ARTIFICIAL SAUSAGE CASINGS can be produced either in the semi-opaque effect which resembles natural sausage skins, or in a clear transparent effect. As disclosed in British Patent 471,026 (granted Sept. 23, 1937, to Chemische Forschungsgesellschaft m. b. H., Munich), the casings are made of the same material, and the opacity or transparency depends on the mode of preparation. Unlike the familiar cellulosic casings the new product is made from a vinyl resin of the acetal type, made by treating polyvinyl alcohol with formaldehyde. This resin, in 8 to 10 per cent solution in a mixture of benzene, methylene chloride and alcohol, is formed to shape by dipping a glass tube into the solution, drying the resulting film, stripping the film from the tube and stretching it while wet with water. When stretched to three or four times its original length, such a casing is only translucent, not transparent, and it has the appearance of a natural sausage skin. To obtain transparent casings, the same resin is dissolved in a solvent which will not permit water

(*Turn to page* 176)

Self-Latching Gate Stops Thefts

CONSIDERABLE TROUBLE was experienced at an ice cream plant from thefts by small boys. They were attracted by the daily return of ice cream that became too mellow and soupy to be served. These returns were left in the cans by the drivers, being just set off at the can room. The boys came to get the ice cream, but never hesitated to steal anything else they could get away with.

The truck entrance to the plant yard is through a narrow alley between buildings. We first put a wooden gate, locked by a padlock, across this alley. That did not stop the pilfering, as it could only be locked at night and was kept hooked open through the day.

So we constructed the metal gate shown in Fig. 1. This gate automatically closes and locks when a truck has passed through.

The new gate is located 2 ft. forward of the truck's front bumper, when a truck is spotted for unloading at the dock shown at the right.

This gate can be latched open by the driver, when he dismounts from his cab, as shown in Fig. 2.

When a truck is ready to leave, the driver pauses as he passes the gate, and jerks the latch cable, as shown in Fig. 3. This releases the latch, so that as the truck passes on through the gate, a small iron counterweight causes the gate to close. The snap lock shown in Fig. 4 keeps the gate closed.

This gate was constructed in our own shop. The frame is 2x2x¼ in. angle iron, reinforced with three bars of heavy duty black pipe, welded to top and bottom strips of 1¾x⅜ in. steel. These latter extend out from the corner braces, being bolted in place.

Alignment is maintained by means of 5/16 in. tension bars, connecting the sides, top and bottom to a heavy ring of 1½x½ in. steel in the center.

The gate posts and lintel are of 2 in. black pipe. The posts are anchored in cement. The lintel rests in holes in the brick walls on either side and is welded to the posts. Two hinges made of ½ in. round bar, completely encircle the post top and bottom and bolt to the angle iron gate frame. A collar, brazed to the hinge post below the bottom hinge, supports the gate, and a similar collar above the top hinge prevents the gate from being lifted off the post.

The gate latch is of 1⅛ in. square bar. In one end is a ⅝ in. stud. The other end is beveled like a door latch. This bolt is surrounded by a coil spring and placed in a piece of 1½ in. pipe which has lugs welded on it and bolted in position by means of these lugs. There is a T-handle on the stud end of the belt, so that the latch can be opened from the inside. A ⅝-in. flat washer, welded to the stud end of the pipe, retains the spring. The T-handle is protected by a hinged metal flap, so that it cannot be reached and operated from outside the gate.

Gate panels are made of heavy wire mesh, and are bolted in place. Strands of barbed wire at the top serve to discourage climbers.

The lintel is 12 ft. above the roadway, which permits the highest of the company trucks to pass under.

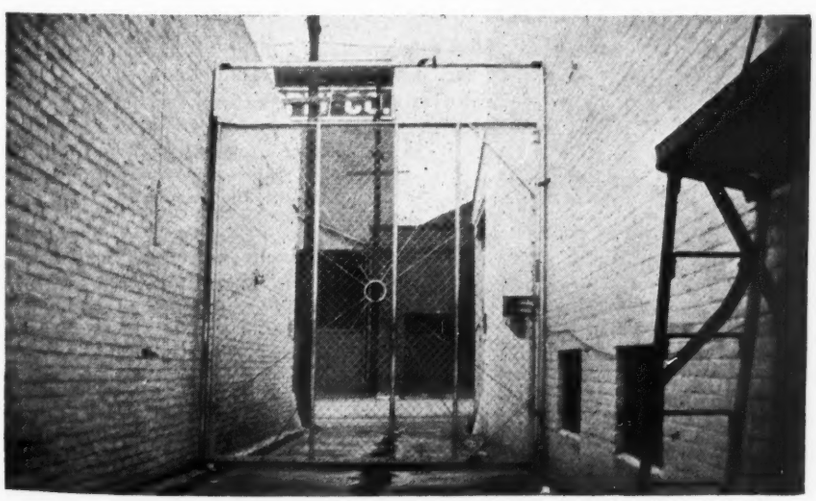


Fig. 1. Alley gate mounted between buildings

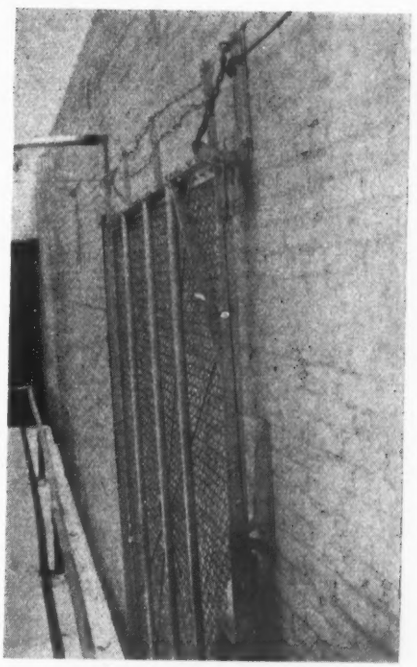


Fig. 2. Gravity hooks hold the gate wide open when latched in place.

Fig. 3. By means of a cable, the driver trips the gravity hooks as he passes out of the gate. A counterweight causes the gate to swing shut and it automatically latches.

The Plant NOTEBOOK

A steel bar bolted to the lintel extends inward 2 ft. over the gate to support a pulley. An eyebolt in the wall supports another pulley. Over these extends a 5/16 in. steel cable, one end of which is fastened to the gate and the other supports a counterweight. Tandem gravity latch hooks are bolted to the wall and engage two of three slam plates, holding the gate open. These slam plates are bolted to the gate.

The trip cable is supported by eyebolts in the wall and a pulley and bracket. A short length of chain, in conjunction with this cable, serves to lift the wall latch and release the door when the driver, in passing out the gate, pulls the cable. The counterweight then causes the gate to close.

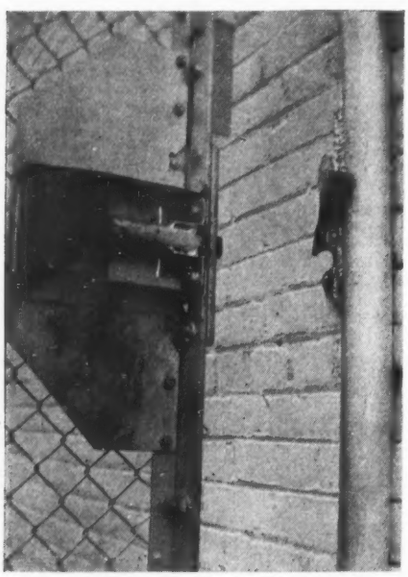


Fig. 4. With the gate ajar, one can see the lock, lock mortise, shield and safety flap.

The total cost of this automatic gate was around $100. For over a year now it has given satisfactory service. —BILLIE BURGAN, *San Diego, Calif.*

Racking Barrels on Drums

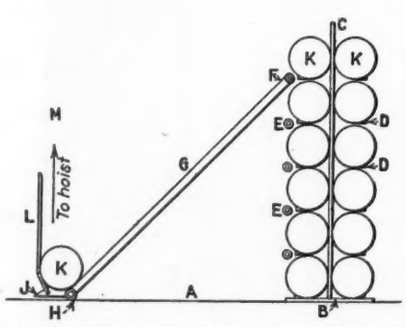
Where any liquid stocks of any kind are stored in barrels or drums, a method that will accommodate the greatest number of barrels in the minimum floor space, as well as allowing any particular barrel or barrels to be taken from the rack without moving any others, is well worth while. Such a method is shown in the drawing, which is merely schematic, illustrating the principles involved. The actual construction of the rack may be worked out in different ways, but it must embrace the parts shown, as well as sufficient strength and stability to support the load.

In the sketch, the drums or barrels are racked six high. It might be five, or it might be seven; that depends upon conditions and where the rack is to be installed. On the floor *A* is arranged the base *B* of heavy lumber, preferably creosote-treated material. Base *B* will be wider than shown if the height of the rack is run as high as here shown. The width of base shown is all right for a height of four barrels or less. It should be wide enough and long enough to prevent any chance of its tipping through top-heaviness.

The center partition *C* will be built fairly heavy and rigidly braced to the base *B* with braces not shown. It must retain its perpendicular position, and will be braced accordingly. The wedge-shaped pieces *D* will be fitted onto cross-girts not shown in the rack. They are cut to fit the curve of the barrel or the drum on their top edge and may be removable or not, as desired. If they are fastened so as to be non-removable, the rack will need to be planned with a little more clearance between barrels than shown, as any individual barrel will have to roll up over the pieces *DD* before it is free of the rack.

A peculiar type of truck is made up for taking barrels from the rack and for replacing them. One end of the truck is fitted with a pair of pivot plates. Thus fitted, the end *F* is adapted for fastening into trunnion plates *EE* positioned at the location of each barrel or drum stall as shown. The truck is run up with its pivot plates in registration with the trunnion plates on the rack, and a rod or bar is pushed through to connect the two.

When a barrel *K* is to be placed in the rack, it is rolled onto the little truck, while the knife-edge nose is held to the floor, as indicated at *J*, the hoist cable being at that time removed. The truck is so formed as to provide a natural little cradle in which the barrel will lie. It can then be wheeled to the racks and connected to a pair of trunnion plates as already noted. Since the truck rolls and fulcrums at will on the little wheels *H*, the end *F* may be connected to any set of trunnion plates, corresponding to any barrel stall in the rack. The lowest stall in the rack of course has no trunnion plates, for a barrel can be rolled directly into this stall.



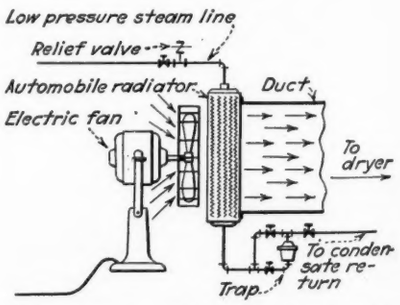
Arrangement of rack and truck for stacking barrels or drums

With the truck end *F* connected to the trunnion plates, a hoist cable is attached to the lower end of the truck as indicated at *L*, and by means of an electric or an air hoist in the approximate location *M*, the truck with its barrel is lifted, pivoting on *E*, until the barrel runway *G* comes level, at which time the barrel or drum can be rolled gently into the rack. The process is simply reversed for removing barrels from the rack.—JOHN E. HYLER, *Peoria, Ill.*

Auto Radiator as Temporary Heater

Occasionally there is need for a source of warm air, either for drying or space heating in the plant or laboratory. When a permanent installation is desired, unit heaters or other forms of fan and coil systems are usually installed. When the need is temporary and no spare heater is available, a simple arrangement using a second-hand automobile radiator and an ordinary electric fan will often prove satisfactory.

Such an arrangement as used in one food plant for drying is shown in the sketch. A source of low pressure steam is connected to the filling opening of the radiator. To avoid pressures in excess of 10 lb. this line is protected with a relief valve. The drop or trap connection is taken from the radiator drain opening. All other openings are plugged. Where the heater is installed temporarily, condensation recovery is not economical and if a trap is used it discharges to waste. If no trap is available a partially opened valve in the drain line will serve the purpose.—S. H. COLEMAN, *Roanoke, Va.*



A dryer was supplied with heat by this temporary hook-up, using an old auto radiator and an electric fan.

Food Equipment News

REVIEW OF FOOD PROCESSING EQUIPMENT, ACCESSORIES, AND SUPPLIES

Plastic Spray Coating

AMERICAN CONCRETE & STEEL PIPE Co., Box 1428, Arcade Station, Los Angeles, Calif., has developed "Amercoat," a sprayable corrosion-resistant plastic. It resists acetic acid, other acids, caustics and oils, among other things, in a range from –50 to 150 deg. F. It will adhere to concrete, steel or wood. Application is made by means of paint-spraying apparatus. It may be used in colorless form, or with any pigment desired.

Air Remover

Co_2 GAS REPLACEMENT OF AIR in the neck of filled bottles is the function of a new machine made for bottlers by Liquid Carbonic Corp., Chicago, Ill. This machine, known as Expelaire, operates in the bottling line between the filler and crowner to deliver CO_2 into the bottle neck under very low pressure and force out the air that lies above the contents of the bottle. Replacement is accomplished by the mechanical lowering of a thin tube into the bottle to be on a level with or slightly below the level of the bottle contents and the automatic discharge of enough CO_2 gas to force out the air in the bottle neck. Application is particularly for the bottling of beer.

Claim is made that bottles of beer crown-sealed after passage through this gassing machine contain from $\frac{1}{4}$ to $\frac{1}{2}$ cc. of air at the most, which is not enough to cause sedimentation, discoloration or off-taste, while bottles not freed from air normally contain 4 to 5 cc. of air and contents is said to commonly deteriorate in four to six weeks.

Turbine Pump

FOR PUMPING BRINES, syrups, or other food liquids of non-viscous character, American-Marsh Pumps, Inc., Battle Creek, Mich., offers the Type V turbine pump. As in a centrifugal pump, this device has only one moving part, the impeller. Unlike the centrifugal pump, with this turbine design the power required increases as the head increases, and not as the head decreases.

This pump can be driven by motor, engine, V-belt or flat belt. It is designed to operate at speeds up to 3,500 r.p.m. It will operate at pressures up to 175 lb. in a single stage, and in series or 2-stage construction for higher pressures.

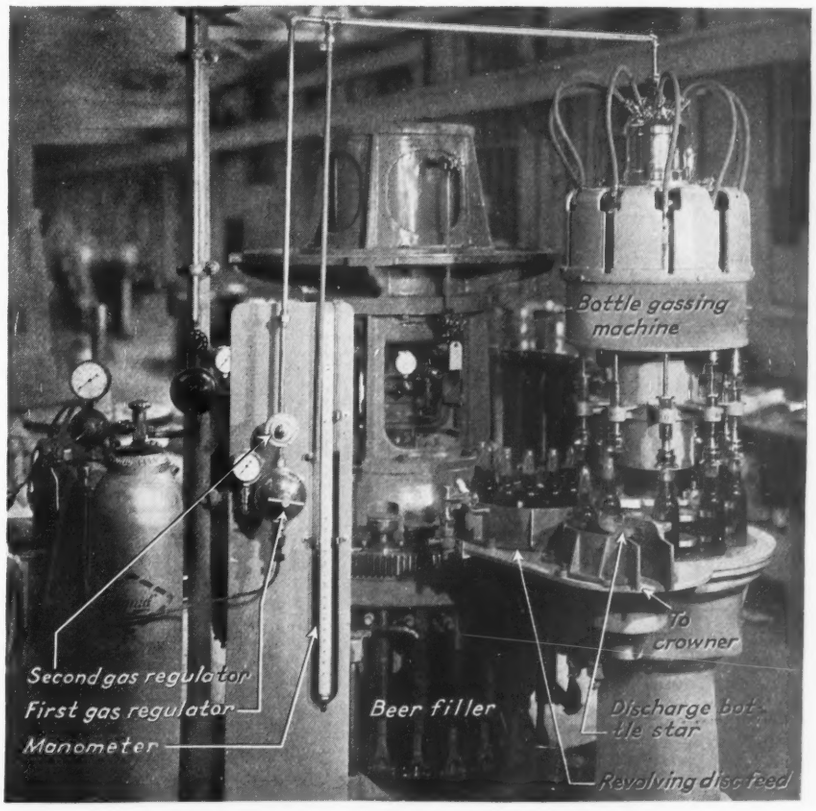
Thermometers

FOXBORO Co., Foxboro, Mass., has introduced a redesigned line of indicating and recording thermometers. These instruments are called "Monotherm" thermometers, and employ a thermal system which provides a permanent seal for the actuating medium. This entire system is welded into an integral whole.

Available with the "Mono-therm" recording instruments is a new extra over-range protection. The liquid-filled instrument can be protected against an over-range up to a maximum of 500 deg. F., that is, 250 deg. F., can be protected to 500 deg. F., or 350 deg. F. can be protected to 500 deg. F. Similarly, the gas-filled instrument can be protected against an over-range of 100 per cent up to maximum of 1,000 deg. F. The vapor-pressure type can be protected for a 100 per cent over-range to the breakdown point of the actuating medium.

Dehumidifying

CARRIER CORP., Syracuse, N. Y., has added Silica Gel dehumidifying equipment to its line of air-conditioning equipment for industrial purpose. This permits exact control of dehumidifying, even to very low humidities, without the use of low temperature refrigeration. It also permits the



Machine to remove air from bottle necks after filling bottles

control of humidity to be separate from the control of air temperature, and makes it independent of air circulation control.

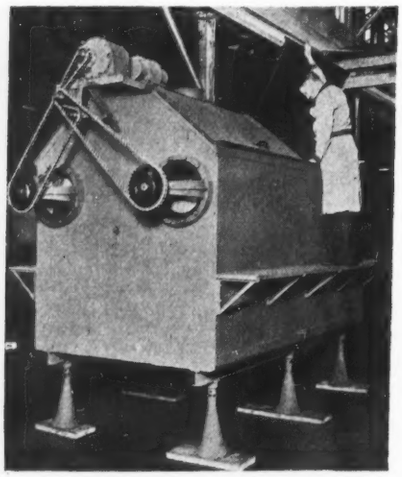
With this addition to its line, Carrier Corp. will be able to apply full air conditioning, or dehumidification and partial air conditioning in the solution of many industrial processing problems.

Pressure Lubricator

FOR LUBRICATING BEARINGS, gears and other machine parts, American Chain & Cable Co., Inc., York, Pa., has announced the Acco-Morrow pressure lubricator. This supplies lubrication under pressures up to 1,000 lb., serving to flush dirt and grit out of parts at the same time as they are lubricated. The tip on the lubricator is designed to make pressure-tight contact with any common oil hole, and will fit nearly all sizes and types of cups and oil hole covers in general use.

Continuous Hop Strainer

RAPID STRAINING, effective sparging, and lower labor cost as well as continuous operation are claimed for the hop strainer recently introduced to the brewing industry by Wittemann Company, Inc., Buffalo, N. Y.



Continuous hop strainer

A spreader type inlet distributes the incoming wort and hops evenly over the slotted strainer plates to permit the greater portion of wort to drain quickly away from the hops in the first compartment of the strainer. Remaining portion of wort washes hops into slotted trough in which operates a slow-moving screw to move the drained hops towards the discharge outlet. As these hops move in small quantities into and through the second compartment of the strainer, they are sparged or washed free from adhering wort by a spray of water and the pushing action of the screw, with very little if any squeezing pressure to force out the bitter principles of the hops.

If the spent hops are to be run into a sewer, a supply of water at the outlet is sufficient for their direct removal. If they are to be disposed of otherwise, the discharge can be made directly and automatically into the receptacle provided for their removal from the brewery. Strainer plates may be raised to permit easy cleaning on both surfaces and the slotted conveyor troughs rotate to make scrubbing of under surface easy. A manhole on side of wort tank permits easy access to interior of strainer for cleaning and servicing.

Because of its continuous and automatic discharge of both wort and spent hops, one strainer unit will handle the output of two or more brewing kettles if the brews are scheduled so that they will be dropped in successive order.

Resistant Paper

WHERE A WATERPROOF, grease proof, or air-tight wrapper is needed in packaging foods, B. F. Goodrich Co., Akron, Ohio, offer "Koroseal Paper." This paper consists of a thin coating of Koroseal (a synthetic elastic product, somewhat similar to rubber, but containing no rubber) applied to a 40 lb. kraft paper.

In addition to being air-tight, and unaffected by water, oil or grease, the material is non-tainting and non-toxic in contact with foods. It will flex repeatedly without cracking. It softens in temperatures from 200 deg. F. and up, and can be sealed against itself at 390 deg. F.

The resistance to tearing is said to be twice as great as with the same paper without the Koroseal coating.

Slicer and Wrapper

AN AUTOMATIC combination bread slicer and wrapper has been developed by Oliver Machinery Co., Grand Rapids, Mich. This machine, called the "Slice-N-Wrap," will also wrap bread without slicing and will wrap certain kinds of rolls and buns as well. It is equipped to heat-seal cellophane, glassine or wax paper. Packages can be wrapped in single or double sheets. A banding attachment is also available.

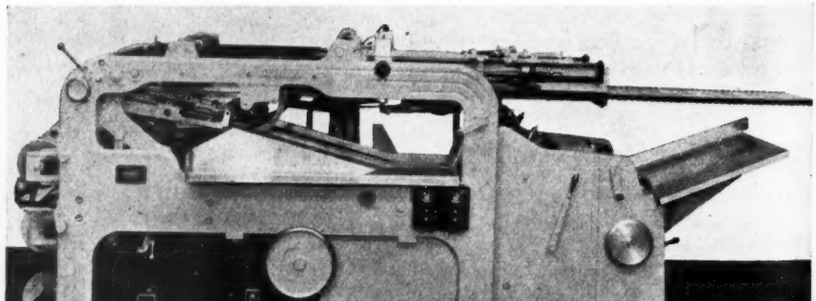
The machine is made up of three units. The first is a slicer, built in a main frame of its own, with its own motor and feed mechanism. The infeed table is built to accommodate ten loaves of 4½-in. width, the loaves being placed side by side on the incline. The entire slicer is carried on casters, and is pivoted at one corner, so that the unit may be swung clear of the rest of the machine for easy access, changing of knives, sharpening, and so on.

The second unit is the wrapping mechanism. It has a heavy cast iron main frame, under which the slicer frame fits, as shown in the accompanying photograph.

The third part of the machine is the sealer. It is provided with flexible heated fingers attached to the bottom hot plate. These project above the bottom hot plate surface, so as to contact hollow bottom packages. To the rear of the bottom hot plate is the bottom seal, or cold plate, which contacts the warm wrapper, cools it, and sets the bottom seal.

After bottom sealing, the ends of the package are contacted by endless belts which move it down the conveyor to the point where cold plates set the end seals.

The cooling mechanism, located under the main frame, at the opposite end from the slicer, has its own motor. Capacity of the machine is from 16 to 25 packages per min.



Bread slicer and wrapper

News

General News—Business Trends—Men, Jobs and Companies

Soil Conservation, Ever Normal Granary And Quotas Included in Agricultural Act

Intended as a farm relief measure, but profoundly affecting the supplies of raw materials for food manufacturers, the Agricultural Adjustment Act of 1938 became a law on Feb. 16. This is a measure with about as many provisions as a machine gun has bullets. It continues the soil-conservation program, making this a part of a "permanent" farm policy. Then it establishes production quotas for the basic cash crops —including wheat, corn, rice, cotton and tobacco—provides for loans to farmers to enable them to hold surplus crops until needed, sets up marketing quotas backed by penalties on sales in excess of the quotas, releases supplies of corn from storage under marketing quotas when a shortage of the commodity develops and provides for crop insurance on wheat.

Some other interesting provisions of the bill include the establishment of four agricultural research laboratores at a cost of $4,000,000, mandatory use of a third of customs-duty collections for expansion of markets for farm products, and the stipulation that the Secretary of Agriculture intervene in freight-rate hearings before the Interstate Commerce Commission in cases affecting the agricultural commodity rates.

The measure also authorizes the expenditure of $1,000,000 for Commerce Department campaigns to expand sales of farm products and to purchase cotton on which the government has made commodity loans.

But aside from the effect of the measure in stabilizing supplies of raw materials, the main interest which it holds for food manufacturers is that it probably will necessitate the levying of processing taxes. In fact, the legislators plan to incorporate taxes on wheat and cotton in the general tax bill now before the House Ways and Means Committee.

Under the quota provisions of the measure, the Secretary of Agriculture is authorized to set quotas on wheat when estimates indicate that total supplies would exceed 940,000,000 bu.; on corn when supplies exceed 2,700,000,000 bu.; rice, 13,310,000 bbl.; cotton, 19,500,000 bales.

To make the quotas "stick," provisions are made for fines of 15 cents a bushel on wheat, a cent a pound on rice and 2 cents a pound in 1938 and 3 cents in 1939 on cotton marketed by farmers in excess of the prescribed amounts.

Under the soil-conservation section it is stipulated that 27 per cent of the expenditure go to cotton producers, 14 to wheat farmers, 15 to corn-hog farmers and 44 to growers of all other crops. The current budget provides a sum of $440,000,000 for soil conservation.

In addition to the soil-conservation benefit payments, parity payments will go to farmers growing wheat, cotton, corn, rice and tobacco, if Congress provides the additional funds required to do this.

The commodity loans are to be made to producers of farm products generally, and regardless of their cooperation in the soil-conservation program. The measure directs that loans be made to wheat farmers when the price drops to 52 per cent of parity. Corn loans are to be made if the price falls under 75 per cent of parity.

Wheat-crop insurance protecting wheat yields at from 50 to 75 per cent of the average normal harvests is to be offered on an all-risk basis. Crop-insurance premiums collected from the farmers are expected to pay all losses.

CONVENTIONS

MARCH

3–5—Canners' League of California, Del Monte, Calif.

14–17—American Society of Bakery Engineers, Edgewater Beach Hotel, Chicago.

14–17—Minnesota Institute of Cereal Chemistry, University of Minnesota, Minneapolis.

14–26—Brooklyn Food Show and Household Appliance Exposition, 245th Regiment Armory.

22–25—Eighth Annual Packaging Exposition and Conference, sponsored by American Management Association, Palmer House, Chicago.

APRIL

12—Frozen Pack Conference. (Meeting place will be announced later by M. A. Joslyn, College of Agriculture, University of California, Berkeley.

12–14—Pacific Northwest Bakers' Conference, Multnomah Hotel, Portland, Ore.

25–27—Fourth Annual Chemurgic Conference, Omaha, Neb.

28–29—Millers National Federation, St. Louis.

Will Revise Wage Bill

Like most of the other pet ideas of the Administration, the proposed wages-and-hours legislation will not die. The latest development is an announcement by Mary T. Norton, of the House labor committee, that the wages and hours bill will be revised and fed into the legislative machine at Washington the last of this month or the first of next. She believes Southern opposition to the measure has been tempered and that chances for its passage are bright. Just what changes will be made in the proposed legislation have not been disclosed, but it is believed by those close to the situation that the revamped bill will seek only to check overly long hours and abnormally low wages.

Would Seize Japan's Floating Fish Canneries

Confiscation of Japanese floating salmon canneries operating in Alaskan waters is requested by Anthony Joseph Dimond, Alaskan delegate to Congress, in his bill H.R. 8344. Progress of legislation of this type, however, is impeded by the efforts of the State Department, which has been seeking to soft-pedal all talk of Japanese salmon poaching. Dimond contends that this attitude is foolish, since the whole question is liable to be ripped wide open by clashes between American and Nipponese interests, which would create the sort of situation the diplomats of the state department are seeking to avoid.

In presenting its side of the controversy, the State Department argues that the United States has more to fear than trouble with Japan, since a large proportion of the tuna used in this country comes from the waters off the west coast of Mexico. And that country, which has close ties with Japan, might be encouraged by the Japanese to raise a storm with us over our tuna fishing.

The Coast Guard is getting ready for further action, however, and has announced that it is preparing to extend its aviation operations to Alaska next summer. The Navy also is planning the construction of a large naval air base in Alaska.

According to Senator Schwellenbach, the Japanese last summer operated 26 floating canneries at one location off the Alaskan coast and smaller fleets in other locations.

Macaroni Makers Adopt Trade-practice Rules

Adoption of fair-trade-practice rules for recommendation to the Federal Trade Commission was an accomplishment of the two-day session held by the National Macaroni Manufacturers' Association, Jan. 23-24, at Chicago.

These rules condemn misrepresentation of macaroni products and their egg content, use of deceptive coloring, containers or illustrations, defamation of competitors, failure to brand products, below-cost selling, imitation of trademarks, false pricing and invoicing.

They also define macaroni products in terms of macaroni, egg macaroni, plain noodles and egg noodles. Provision is made for compliance with the Robinson-Patman Act.

Executive president, Lester S. Dame, Bloomfield, N. J., announced plans for a statistical service for members of the association, a comprehensive cost system, and formation of regional groups.

June 20 and 21 were the dates announced for the annual convention of the industry to be held at the Edgewater Beach Hotel in Chicago.

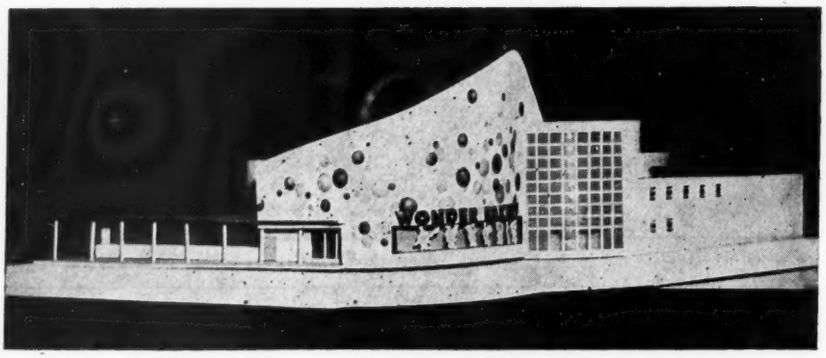
Preserving Men Plan Additional Activities

A closer relationship between its active and allied-industry members was an objective of the Jan. 23-24 meeting of National Preservers' Association at Chicago. As a move in this direction the semi-monthly news bulletin of the association is to be enlarged and will carry announcements of new products, new machinery and new processes made available to the industry by the allied members. Also, provision was made for the holding of one or more group meetings annually in the producing sections. These meetings are to be conducted by W. L. Walde, who is now the managing director of the association. They are to be for the purpose of promoting better production procedure, lowering manufacturing costs and putting the products on a uniform high-quality basis.

Action was taken for the setting up of committees to study the questions of a quality standard or definition for orange marmalade, of a cooperative advertising program and of suggested changes in the standards to the Northwest Barrelers' Association.

A subject of particular interest was the continued endorsement of and support to the fair-trade-practice regulations adopted a year and half ago.

Lloyd H. Smith, Bliss Syrup & Preserving Co., Kansas City, Mo., was named president of NPA. Other officers are: vice-president, F. Olney Brown, Squire Dingee Co., Chicago; secretary-treasurer, Wayne C. Meschter, American Preserve Co., Philadelphia; and chairman of the executive committee, Royal Shawcross, A. A. Knights & Son Corp., Malden, Mass.



WILL HOUSE BAKERY EXHIBIT AT FAIR

Model of unusual building which is to be erected at the New York World's Fair 1939 by Continental Baking Co., New York. The structure will house a large-scale exhibit of the processes of making cake and bread. On the facade of the building, 10-ft. mechanical figures of bakers will be shown in action. Another feature of Continental's display will be a large outdoor field of growing wheat.

CAPITAL VIEWS

SALES HURDLES — Restrictions on marketing by Federal action are vastly more imminent and serious than at any time in the past. The fact that there is not so much noise now seems merely to prove that real progress in legislation is being accomplished. Washington does not expect the more radical Patman ideas to prevail at once. But continued pressure of anti-chain advocates is beginning to be felt.

AD CENSORSHIP—Washington is now beginning to take for granted the enactment by Congress of the Lea-Wheeler bill, extending the authority of the Federal Trade Commission. The conference committee redraft has been approved by the House. The Senate is expected to add its O.K. soon after the "lynch law" filibuster is terminated. Enactment of that bill will put complete supervision of advertsing in the hands of FTC, with a certainty that flowery deception and warped implications will no longer be profitable even if they seem to sell lots of goods to consumers.

LOW INVENTORIES—Commerce Department surveys indicate that food products inventories at the start of 1938 were much lower than a year before. Nearly 80 per cent of the manufacturers reported such decline. Which means that the business recession effects on food manufacturers ought to be ended quicker than in other fields still troubled by the existence of over-normal stocks.

NEW DEFINITION—A chain store is not a "broker." This is a safe inference from the A. & P. cease-and-desist order issued by the Federal Trade Commission just a bit too early to be a Valentine. And there are many more inferences, some of them clear, but many vague, to be drawn from this important case. Perhaps as important as anything is the fact that FTC did not try to pussyfoot by using some small concern with a thin pocketbook as the trial-case victim. The issue will be fought out on its merits very fully, with a strong company certain to get everything for indutry which the law will rightly allow.

FISH-MARKET NEWS— A regular market-news service is to be furnished by the Bureau of Fisheries, which began daily publication in mid-February of news helpful to fishermen, fish processors and the fish-merchandising trades. The objective is to help seafood producers and purveyors just as the Department of Agriculture has long assisted the agricultural producers and affiliated industries. It is expected that producers and distributors of other meat substitutes—including cheese, egg, poultry and even macaroni folks—will watch this fish news closely for helpful information.

SOME SURPRISE—Government officials who managed the little business men's conference experienced an unpleasant surprise. Especially since Congressmen listen to these executives from the home towns even more attentatively than to the big names which make the front pages after Congressional hearings. The 23 resolutions of the little business men, even as edited and handed to the President, call for less government interference and less reform. As first drafted by the several subcommittee conferences, they shouted for this even more loudly. The unexpurgated editions at the early stages are the ones that Congress will read and follow most closely. But no one need expect that all reform measures have been abandoned. Witness the farm bill as enacted. It has rightly been called "25,000 words of concentrated ambiguity."

Variable-speed Type Of AC Motor Developed

Through a new design developed by Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., there is now available a three-phase, alternating-current motor adjustable to operate efficiently at any speed from slightly above zero speed up to full rating. This motor provides an important new machine drive for the food and other industries.

Previous designs of a.c. motors developed for this purpose included the slip-ring and brush-shifting motors. The new motor, however, avoids these expedients and has characteristics similar to those of a d.c. shunt motor.

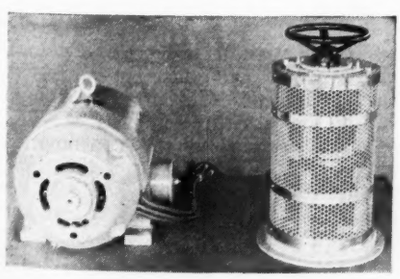
Features claimed for this new motor include: Regulation from standstill to 150 per cent of synchronous speed, without rheostat losses; operation on full field, which gives full torque over the entire speed range; speed practically independent of load; full-voltage starting; dynamic braking; remote and automatic control of speed, if desired.

Speed regulation is obtained by applying a "bucking" voltage to the motor brushes. If this voltage is exactly equal and opposite to the voltage generated in the rotor by the revolving field, no current will flow in the rotor circuit and the rotor remains stationary. When the bucking voltage is gradually reduced, by means of the regulator shown at the right in the accompanying illustration, the difference between it and the voltage generated in the rotor winding will cause current to flow in the rotor. This current develops torque and the rotor will revolve. By adjusting the bucking voltage, the motor can be made to run at any speed from standstill to slightly below synchronous speed. By changing the bucking voltage to an "assisting" voltage, done by adjustment of the voltage regulator, speeds higher than synchronous are obtained.

Operation at speeds below 600 r.p.m. is possible for short periods only without some external source of air cooling. Top speed of the motor is 1,800 r.p.m. The motor is started directly across the line, the speed regulator being set at the minimum position in starting the larger motors.

At present these motors are available in sizes up to 7½ hp.

The power factor, which depends upon the brush setting of the motor, is about the same as that of an ordinary induction motor at the higher speeds.



Variable-speed a. c. motor

Spinach Cost Found $1.05

Cost of producing a case of spinach in No. 2½ cans has been found to be $1.05 in California by the Canner's Industry Board. This was determined from reports made by canners as part of the stabilization plan of the industry. The plan was set up on a three-year basis by 31 independent packers of fruits and vegetables in California.

Pickle Packers Face Big 1938 Carry-over

Declaring opposition to Federal licensing of all businesses and resolving for repeal of the capital-gains and undistributed-profits tax, the National Pickle Packers' Association closed its annual meeting in Chicago on Jan. 26.

A report by the association's secretary stated that the Jan. 1 salt-stock carry-over was 3,368,154 bu. for 33 members of the industry, based upon acreage figures for 1937. On such a basis the salt-stock carry-over for the industry is 6,502,000 bu. Dill pickles on hand Jan. 1 totaled 16,848 casks.

The data is this report are to be considered in the light of a one-million-bushel carry-over of 1936 pickles, a seven-million-bushel crop in 1937 and an annual six-million-bushel consumption, leaving a probable two-million-bushel stock of pickles when the 1938 crop begins to come in.

Because this anticipated carry-over is about twice the carry-over for 1937 and equal to about one-third the annual consumption, the packers went on record as discouraging any increase in total acreage planted or contracted for. They also stated their plans to limit the intake of large pickles.

Because the Jan. 1 carry-over holdings are in strong hands, prices to be paid for new crop pickles were estimated to be about the same as were paid in 1937, with the possibility of slightly higher prices for small pickles.

The pickle packers again elected E. S. LaFrance, Peppin Pickling Co., Winona, Minn., president.

Egg and Poultry Men Hold Fact Conference

Ready-to-cook poultry, grade buying of eggs and of poultry, egg molds and wider use of eggs were among the subjects discussed during the annual "fact-finding conference" of Institute of American Poultry Industries, Jan. 26-27, at Chicago.

Harry Drews, Omaha Cold Storage Co., leader of the discussion on eviscerated poultry, gave dealer resistance, lack of low-temperature display and storage equipment in retail outlets and price confusion in minds of consumer buyers as the chief problems facing the producer of packaged ready-to-cook poultry.

R. R. Reesman, Swift & Co., explained the receiving-room procedure suitable for grade buying of poultry and commented on the pitfalls and advantages that have to be reckoned with in grade buying. Prof. E. R. Menefee, Purdue University, dealt with the fundamental factors in the grade buying of eggs. He particularly emphasized the need of prompt movement of eggs bought and packed on a graded plan.

In reporting his isolation of nearly 300 cultures of egg molds, Dr. M. L. Mallman, Michigan State College, classified them as falling in more than twenty different species of the penicillium, aspergillum and mucor types of molds. Experimental tests for their control and extermination showed that these molds varied in resistance to the different types of fungicides. A phenol derivative shows most promise.

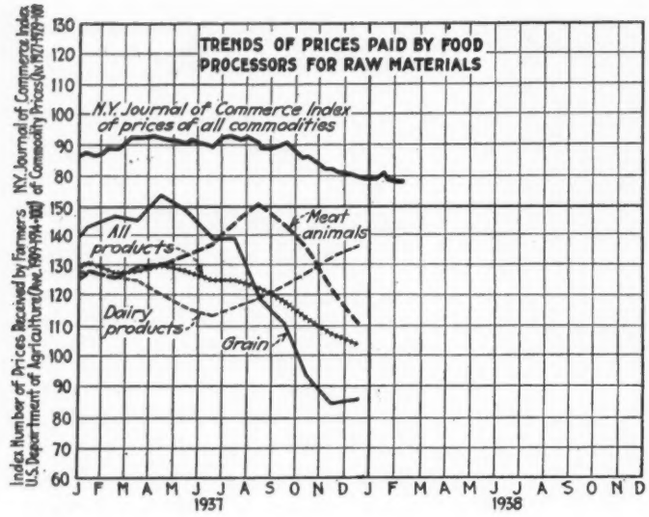
CONCENTRATES

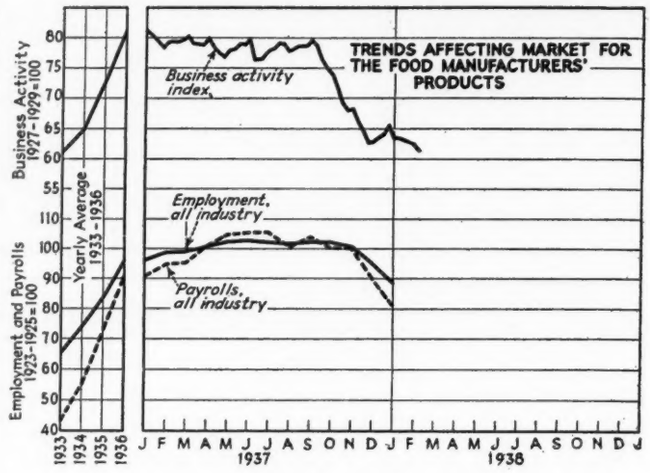
• Formal notice of intention to negotiate a new trade agreement with Canada has been given by the Secretary of State. Many food products will be involved . . . Representative Patman has introduced a federal bill taxing chain stores. The first nine stores are exempt; from nine to fifteen stores, the tax would be $50 a store; for each store in excess of 25, $100 per store, in excess of 500, $1,000 per store . . . Proposals to repeal the Miller-Tydings anti-price-discrimination act have been introduced in Congress, but are not taken very seriously.

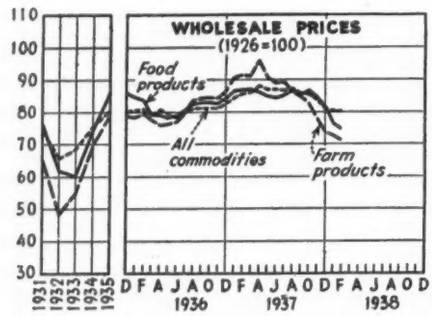
• *Food and drug legislation continues stalemated, with no prospects of early action . . . State taxes on margarine yield less revenue than any other type of state taxes, according to findings by Tax Policy League, New York. The yield is only 0.01 per cent of the total revenue from state taxes . . . Aided by a reciprocal trade agreement, 1937 lard exports to Cuba jumped to 41 million pounds as compared with 31 million in 1936.*

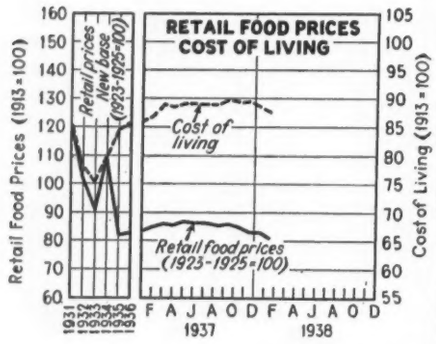
• *A tax of three cents a pound on bread imported from Canada is provided in a bill introduced in Congress. Seventeen bakeries in northern New England are reported to have been closed by Canadian competition . . . Starfish threaten to destroy the scallop industry at Edgartown, Mass., and Massachusetts will contribute heavily to the cost of eradicating the predatory fish . . . A short course in ice cream making will be offered by the University of Minnesota, March 14-19.*

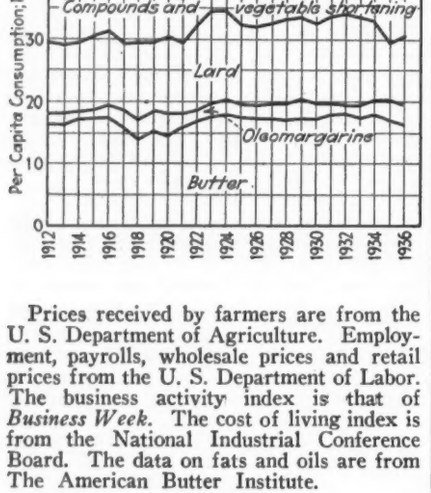
• Less than three-tenths of a cent (0.288 cent) was the net profit per quart of milk among 14 distributors serving Metropolitan New York for the first nine months of 1937, it has been revealed by an audit conducted under the auspices of the New York State Department of Agriculture. The net sales price amounted to 9.671 cents; product cost, 4.258 cents . . . Construction at Atlanta of a cold-storage warehouse to cost nearly $1,000,000 is contemplated . . . A stockyard has been opened at Sandersville, Ga.


TRENDS OF PRICES PAID BY FOOD PROCESSORS FOR RAW MATERIALS
N.Y. Journal of Commerce Index of prices of all commodities
All products
Meat animals
Dairy products
Grain
Index Number of Prices Received by Farmers, U.S. Department of Agriculture (Ave. 1909-1914=100)
N.Y. Journal of Commerce Index of Commodity Prices (Av. 1927-1929=100)
J F M A M J J A S O N D J F M A M J J A S O N D
1937
1938


Business Activity 1927-1929=100
Employment and Payrolls 1923-1925=100
Yearly Average 1933-1936
TRENDS AFFECTING MARKET FOR THE FOOD MANUFACTURERS' PRODUCTS
Business activity index
Employment, all industry
Payrolls, all industry
1933
1934
1935
1936
J F M A M J J A S O N D J F M A M J J A S O N D J
1937
1938







Prices received by farmers are from the U. S. Department of Agriculture. Employment, payrolls, wholesale prices and retail prices from the U. S. Department of Labor. The business activity index is that of *Business Week*. The cost of living index is from the National Industrial Conference Board. The data on fats and oils are from The American Butter Institute.

BUSINESS TRENDS

Commodities Mark Time

Raw material prices declined slowly during the month from mid-January to mid-February, but the movement had a drifting character, being marked by no sharp advance or recession. Food commodity prices showed a decline, according to the weighted index of the *New York Journal of Commerce*, from 68.6 to 65.4. In the same time that publication's general index for commodities fell from 80.3 to 78.3. The greater fall in the food index is attributed to the usual seasonal decline in prices of eggs and dairy products.

While the above price movements were taking place, Moody's more sensitive index of commodity prices fell from 152.4 to 148.6 (Dec. 31, 1931—100).

Reports of food production and food sales show normal tonnages for the season although dollar volume is somewhat lower. This fact, in conjunction with the behavior of the price indexes, probably indicates that sales of cheaper foods are tending to keep up the tonnage, and that pressure on the prices of food raw materials continues.

Comment on this food-price situation by various analysts indicates that food commodities are likely to remain near present levels until some new major influence is brought to bear. Such an influence might be found in threats of inflation, in a further drastic cut in consumer buying power, or in some shift in world politics and economics. Failing these, the arrival of spring and new crops will be the next strong influence to affect food commodity prices.

Who Has Canned Foods?

According to the quarterly canned foods stock report of the Bureau of Foreign and Domestic Commerce for the current period, total canners stocks of the four principal vegetables were more than twice as great on Jan. 1, 1938, than a year previous. In contrast, representative distributors stocks, covering about 70 per cent of wholesale trade, were slightly less for the same four foods.

The figures reported Jan. 1, 1938, show the following stocks in canners hands, sold and unsold: peas, 11,907,175 cases, all sizes (January 1, 1937—6,663,853 cases); corn, 13,251,721 cases, all sizes (1937—5,843,517 cases); tomatoes, 10,144,319 cases, all sizes (1937—8,823,622 cases); and green and wax beans, 2,896,635 cases, all sizes (1937—1,515,507 cases).

These canners stocks are in contrast to stocks of the same vegetables in distributors' hands on Jan. 1, 1938, which were: peas, 1,190,294 cases, all sizes (1937—1,418,843 cases); corn, 1,386,915 cases, all sizes (1937—1,416,636 cases); tomatoes, 1,193,751 cases, all sizes (1937—1,763,890 cases); and green and wax beans, 599,214 cases, all sizes (1937—665,309 cases).

Changes In Oil Use

According to a report of the U.S. Department of Commerce, covering the last quarter of 1937, some shifts are taking place in the consumption of edible oils. As already widely noted, cottonseed oil consumption has greatly increased. The report indicates some of the effects of this increase on the use of other edible oils. For instance, refined peanut oil consumption fell to approximately one-third of the amount used in the last three months of 1936. Also, refined coconut oil consumption was 20,000,000 lb. less in the 1937 period than in 1936, while soy bean oil consumption fell 24,000,000 lb. for the same periods.

Another point brought out in the report was the increased use of refined palm oil. In the 1937 period some 28,-

Construction News

	Pending (thousands)	Awarded February (thousands)	Total Awarded 1938 (thousands)
Bakery	$80	$40	$280
Beverages	340	534	1,034
Canning and Preserving	130	.....	75
Confectionery	.....	.....	.....
Grain Mill Products	.....	.....	.....
Ice Manufactured	.....	150	260
Meats and Meat Products	105	45	1,073
Milk Products	.....	90	190
Miscellaneous	1,545	395	658
	$2,200	$1,254	$3,570

000,000 lb. of this commodity were used as food, mostly, it is thought, in shortening, while none was reported as used in 1936.

Vegetable shortening use also increased for the period, obviously at the expense of lard, from 432,208,732 lb. in the 1936 quarter, to 441,146,998 lb. for the 1937 quarter.

Edible oil imports also show changes in December, 1937, compared to the same month of 1936. Coconut oil was 34,842,000 lb., compared to 29,186,000 lb. Cottonseed oil imports were only 49,284 lb., compared to 2,215,000 lb. in December, 1936. Total edible oil imports were 72,768,637 lb. for the month, against 73,242,398 lb. for the previous December. A big yearly gain was registered by palm oil, of which 411,000,000 lb. came in in 1937, compared to but 338,000,000 lb. in 1936.

More Milk and Butter

Recent weeks have seen increased milk production, increased butter production and a sharp decline in butter prices. Milk output in January was reported to be above the output of January, 1937, and the highest recorded since 1934. Milk production per cow on Jan. 1 was 101 per cent of the five year average for the date. The number of milk cows on farms was about the same as a year before.

In the four week period covered by the reports of the American Butter Institute from Jan. 19 to Feb. 9, butter prices fell 3½ to 4 cents, from 33 cents to 29 cents for extras, and from 32½ cents to 29 cents for standards. In the same weeks the average increase in production over the corresponding week of 1937, was around 10 per cent per week.

Production of manufactured dairy products in 1937 is estimated by the American Butter Institute as follows:

Creamery Butter	1,611,395,000 lb.
Cheese	624,533,000 lb.
Condensed Milk	247,309,000 lb.
Evaporated Milk	1,857,531,000 lb.

Less Sugar Consumed

The final report of the AAA on sugar deliveries for consumption in the United States in 1937 shows a total of 6,674,690 short tons, raw value, compared to 6,706,218 short tons, raw value, in 1936. The amount of consumption reported for 1935 was 6,632,576 tons, raw value.

It may be inferred from the report that measures taken to restrict sales of off-shore refiners in the United States are taking effect. Domestic refiners and beet sugar producers delivered 5,840,724 short tons in 1937, compared to 5,617,162 short tons in 1936.

More Candy Last Year

An increase of 6 per cent was registered in the sales of confectionery and competitive chocolate products in 1937 over 1936. Total maufacturer's sales value of these products was $253,577,716 last year, compared to $238,891,896 the year before. Most of this increase was accounted for by sales in the first eight months of the year, which were 10 per cent above sales for the first eight months of 1936. For the last four months, 1937 sales were up 1 per cent.

INDICATORS

FISH landings at New England ports in 1937 totaled 388,000,000 lb., compared to 414,800,000 lb. in 1936, as reported by the Bureau of Fisheries, U. S. Department of Commerce.

FISH, frozen, and held in cold storage on Jan. 15, 1938, was 72,629,000 lb., compared to 87,576,000 lb. a year before, according to the Bureau of Fisheries.

CANNED PINEAPPLE and pineapple juice shipped and sold by the Hawaiian Islands in 1937, are reported by the Bureau of Foreign and Domestic Commerce at between 21,000,000 and 22,000,000 cases, the greatest quantity on record.

SPINACH PACK in 1937 was reported by the National Canners Association at 4,952,116 cases, all sizes, compared to 3,318,730 cases in 1936.

PUMPKIN and squash canned last year totaled 1,507,708 cases all sizes, according to the National Canners Association, which reported a total of 1,767,847 cases in 1936.

TOMATOES canned in 1936 totaled 21,267,423 cases, all sizes, while the tomato juice pack was 13,444,972 cases, all sizes, making a grand total of 34,712,395 cases of tomato products, as reported by the National Canners Association.

FROZEN FRUITS in cold storage on Feb. 1, 1938, totaled 117,804,000 lb., compared to 63,610,000 lb. on Feb. 1, 1937, and a 1933-37 average for the date of 64,594,000 lb.

FROZEN VEGETABLES in cold storage, Feb. 1, 1938, totaled 28,168,000 lb., compared to 11,283,000 lb. on Feb. 1, 1937.

BUTTER in storage on Feb. 1, 1938, was 31,083,000 lb. This compares to 42,734,000 lb. the year before, and a 1933-37 average of 35,394,000 lb. for the same date.

CHEESE in storage was 93,340,000 lb. on Feb. 1, 1938, compared to 102,112,000 lb. a year previous and an 1933-37 average for the date of 83,266,000 lb.

EGGS in storage, case equivalent, on Feb. 1, 1938, were 3,051,000 cases, against 1,586,000 cases a year before and an average of 1,575,000 cases for that date in 1933-37.

POULTRY, frozen, in storage on Feb. 1, 1938, totaled 115,091,000 lb. This compared to 178,304,000 lb. on the same date in 1937, and a 1933-37 average for the date of 125,886,000 lb.

MEAT in storage, all kinds, totaled 697,425,000 lb. on Feb. 1, 1938. On Feb. 1, 1937, the figure was 1,062,204,000 lb., while the 1933-37 average for Feb. 1 was 827,207,000 lb.

LARD in storage on Feb. 1, 1938, was reported at 97,300,000 lb. For Feb. 1, 1937, the report was 182,709,000 lb., while the 1937-38 average for the same date was 118,494,000 lb.

WEEKLY FOOD INDEX of Dun & Bradstreet stood at $2.43 for the period ending Feb. 8, 1938. This was 3 cents lower than for the preceding week, and 10 cents below the figure of four weeks previous.

Business Still Waits

Indexes of business activity and of commodity prices still show declines. For the four weeks from Jan. 15, 1938, to Feb. 12, 1938, the *Business Week* index of business activity registered a decline of 3.05 per cent. Business in general was quiet during the period, apparently waiting for something encouraging to turn up.

Steel production in the four weeks from Jan. 15 to Feb. 12, 1938, rose from 27.8 to 30.7 per cent of capacity. In the same period, automobile production fell off about 12 per cent from 1937 figures. Electric power production declined slightly and reached a point about 10 per cent below the mid-February figure of 1937. Retail sales in general have fallen off in both physical volume and dollar total, although the drop in food sales has been mostly in dollar volume.

The United States Department of Labor index of prices of all commodities fell 1.11 per cent for the three week period ending February 5. In the same period, this index for farm products fell 3.40 per cent, while for foods it dropped 2.99 per cent. The weighted price indexes for commodities of the *New York Journal of Commerce* also showed declines. For the four week period ending Feb. 19, these indexes declined as follows: general index, 0.51 per cent; grain index, 3.59 per cent; but the food index rose 2.27 per cent.

MEN, JOBS and COMPANIES

INDUSTRY

» ANGOSTURA-WUPPERMANN CORP., Norwalk, Conn., has made McKesson & Robbins, Inc., sole distributors of Angostura bitters.

» ADOLPHUS RICE MILLING CO., Houston, Texas, will construct a $100,000 rice mill with a daily capacity of 1,440 bbl.

» ARMOUR & Co., Chicago, is now preparing "table-dressed" poultry which is full-drawn, packaged in transparent cellulose and quickly frosted.

» BLATZ BREWING CO. has opened a new distributing plant at Madison, Wis., with a cooling plant capacity of more than 500 kegs.

» BOOTH FISHERIES CORP., Chicago, is quick-freezing fish and seafoods, putting its products up in consumer-size packages. The company has developed its own process of quick-freezing.

» BORDEN'S DAIRY DELIVERY CO., San Francisco, has taken over the distribution of the products of the Milbrae Dairy.

» BOWMAN DAIRY CO., Chicago, has taken over Fisher Ice Cream Co., Oak Park, and is going into the ice cream business.

» J. B. CARR BISCUIT CO., Wilkes-Barre, Pa., is building a $50,000 plant at Greenwood, S. C. The bakery will have a daily capacity of 90,000 lb. of crackers.

» COCA-COLA CO., Atlanta, Ga., has purchased real estate in San Francisco, where it will construct a $1,000,000 distributing plant.

» CREMO BREWING CO., New Britain, Conn., plans a $100,000 construction program, including a new bottling plant.

» CUDAHY PACKING CO. recently acquired a chain of cheese factories operated in northern Wisconsin by Dowd Cheese Co.

» EARL C. GIBBS CO., Cleveland packing firm, has completed remodeling the former plant of Cleveland Provision Co. at a cost of $100,000.

» GORDON BAKING CO., Detroit, will construct a $50,000 milk products plant at Cuba, N. Y.

» GRIESEDIECK WESTERN BREWING CO. plans a $150,000 construction program at its Belleville, Ill., plant.

» H. J. HEINZ CORP. has completed a new building, with 46,000 sq.ft. of floor space, at Oakland, Calif.

» HYDE PARK BREWERIES, INC., St. Louis, has launched a $250,000 expansion program. The improvements will include a new bottling plant, an additional story on the brewery and more aging cellars.

» IDAHO MEAT PRODUCERS, INC., has completed a $120,000 packing plant at Caldwell.

» REFINED SYRUPS, INC., New York, has purchased about half of the former plant and property of the Spreckels Sugar Corp., Yonkers, N. Y. Refined Syrups will spend about $800,000 to remodel the plant.

» SEATTLE BREWING & MALTING CO. recently purchased the plant and equipment of Apex Brewing Co. for $150,000.

» SCHMIDT BREWING CO., Detroit, has begun the construction of a new $300,000 bottling plant which will double the present bottling capacity of the brewery.

» STANDARD MILLING CO. will move its general offices from New York to Chicago about April 1. At the same time, the administrative offices of its four milling divisions will be moved to Chicago and consolidated with the general office.

» STOKELY BROS. & CO.'s canning factory at Tipton, Ind., was destroyed by fire on Jan. 31 with damage estimated at $250,000. The plant's entire stock of canned peas and corn was lost and about half of the tomato supply destroyed.

» SWIFT & CO., Chicago, is negotiating for the purchase of the Marshalltown, Iowa, packing plant of Roberts & Oake, Inc.

» WILSON PACKING CO., Chicago, has purchased the Dold Packing Co. plant at Omaha. It is reported that Wilson will spend between $300,000 and $400,000 on an addition and improvements.

PERSONNEL

» GEORGE A. ALLEBRAND, Colorado Springs, has been elected president of Colorado Association of Dairy Products Manufacturers.

» J. W. CLOPTON, Decatur, has been elected president of the Alabama Dairy Products Association.

» FRED BLUMER has resigned as president of the Blumer Brewing Co., Monroe, Wis., a position which he had held since 1923.

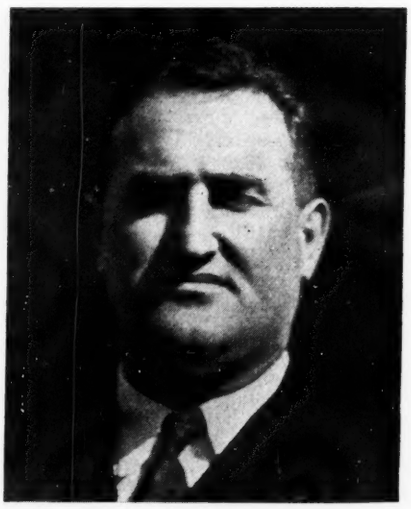
» FRED BORRIES, president of Ballard & Ballard Co., Inc., Louisville, has accepted the nomination for the presidency of Millers' National Federation. The formal election is not held until April, but selection by the nominating committee and acceptance by the nominee is equivalent to election.

» THOMAS A. CATLAN, Toledo, was recently reelected president of the Ohio Bakers' Association.

Blank & Stoller

SAMUEL ZEMURRAY

For the past five years managing director of United Fruit Co., Boston, he has been elected president to succeed the late Francis R. Hart. He organized Cuyamel Fruit Co. in 1910 and was president of it until it was taken over by United Fruit Co. in 1930.



H. H. COREY

He has been made general manager of Geo. A. Hormel & Co., Austin, Minn., the duties of which position are in addition to those of vice-president in charge of production.

» F. B. Childs, Libby, McNeill & Libby, Chicago, has been elected chairman of the Evaporated Milk Association. H. M. Clark, Whitehouse Milk Co., Manitowoc, Wis., was named vice-chairman. E. E. Hughes, Armour & Co., Chicago, was reelected treasurer, and Dr. Frank E. Rice, Chicago, was again made executive secretary.

» Robert S. Dickinson has been advanced from vice-president and general manager to president of Nebraska Consolidated Mills, Grand Island.

» Virgil Essel has become general bakery superintendent of all Kroger Grocery & Baking Co. plants, and Charles Catt is his assistant. Both were assistants to the late Ray Perry.

» J. B. Fuqua is now president of Model Mill Co., Inc., Milan, Tenn. He succeeds his father, the late J. J. Fuqua.

» Dwight K. Grady, president and general manager of Dried Fruit Association of California for many years, has gone with Rosenberg Bros. & Co., leading packer of dried fruits. Harry Dunlap succeeds Mr. Grady as head of the dried-fruit association.

» Hazen Gray has become manager of the Hastings (Mich.) Milk Products Co. plant, which has been purchased by Pet Milk Co.

» C. F. Koenig, who has been connected with breweries in Germany and in South America, will be superintendent of the new brewery being built at Tulsa, Okla., by Ahrens Bros.

» Harvey S. Looper, manager of the Great Western Sugar Co. factory at Lovell, Wyo., has been named manager of the company's factories at Eaton and Greeley, Colo. He succeeds Charles E. Evans, who is retiring after 30 years with the company.

» C. R. Martin has succeeded Robert R. Clark as manager of the St. Joseph plant of Quaker Oats Co. Mr. Clark retired after more than 40 years in the milling industry.

» Oscar G. Mayer, Chicago meat packer, recently was elected president of the Chicago Association of Commerce.

» Edwin Morrison, consulting engineer and former general superintendent of Great Western Sugar Co., Denver, has retired after 35 years in executive positions with the company.

» Alexander L. Nash has become production manager of Meadow Gold Products Corp., Brooklyn, N. Y. He succeeds Lloyd Evans, who resigned.

» John C. Reid has been elected president of National Oats Co., Cedar Rapids, Iowa, succeeding J. R. Matthews, who has become chairman of the board. Mr. Reid formerly was vice-president and general manager.

» G. V. Rector, Omaha, is the new president of Nebraska Ice Cream Manufacturers' Association. Mr. Rector is with Fairmont Creamery Co.

» L. J. Schumaker, American Cone & Pretzel Co., Philadelphia, recently was reelected president of American Institute of Baking.

» Herman A. Smith, Smith & Fyfe, Worcester, Mass., was elected president of New England Association of Ice Cream Manufacturers at the annual meeting held recently in Boston.

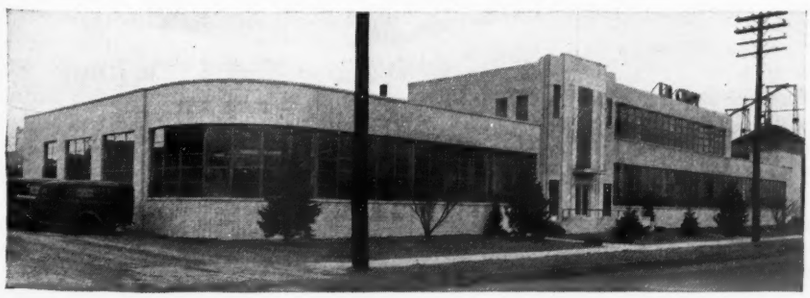
» Oscar M. Stout, well known in the chocolate and candy industries, has joined the sales and service staff of Ross & Rowe, Inc., New York.

» W. W. Wilder has been made president and treasurer of Clyde (Ohio) Kraut Co.

» C. L. Wood, Atlanta, has been reelected president of Georgia Dairy Association.

» Arthur C. Wescott has been appointed manager of the new branch distributing plant opened in Allentown, Pa., by Crowley's Milk Co., Inc., Binghamton, N. Y.

» Martin L. Zook, for thirteen years superintendent and sales manager of Clover Farms Dairy, has purchased a dairy business in Hot Springs, Ark.



STREAMLINED PLANT FOR CHINESE FOODS

La Choy Food Products, Inc., recently completed this modern plant at Detroit. Containing 68,240 sq.ft. of floor space, the building houses production and warehousing facilities and offices. In addition to modern production equipment, the plant is provided with refrigeration facilities to serve a 20,000-cu.ft. cooler and two 600-cu.ft. coolers.

DEATHS

» Ferdinand F. Becker, 81, founder of Brookhaven Creamery Co., which was bought by Cloverland Dairy Products Co. of New Orleans in 1927, at Brookhaven, Miss., Feb. 6.

» Burr Finnell, vice-president and secretary-treasurer of Runkel Cakes & Candy Co., Kenton, Ohio, Jan. 23.

» Charles E. Hayden, 61, president of Central Valley Vinegar Co., St. Louis, and of Kinder (Mo.) Manufacturing Co., at Kinder, Jan. 29.

» Samuel H. Keith, president of Keith's Dairy, Altoona, Pa., recently.

» John L. Kellogg, 27, president of New Foods, Inc., and grandson of W. K. Kellogg, Battle Creek, Mich., cereal manufacturer, Feb. 6.

» Harry Kronau, oldest member of the Old Guard Society of the canning industry, Feb. 2, at Springfield, Mo. Mr. Kronau would have been 90 in July.

» Charles Kulnick, 67, president of Walters Brewing Co., Menasha, Wis., and of Berlin (Wis.) Brewing Co., Jan. 23, at Vero Beach, Fla.

» William E. Telling, 68, president of S.M.A. Corp., Cleveland, and president of Telling Belle-Vernon Co. before its acquisition by National Dairy Products Corp. in 1928, at Cleveland, Jan. 26.

ASSOCIATED INDUSTRIES

» American Can Co. plans an addition to its Indianapolis plant which will equal the present structure in size.

» Canning Industry Research, Inc., announces that license for the manufacture of the Tenderometer has been awarded to the Sprague-Sells Division of Food Machinery Corp., Hoopeston, Ill. The price will be $550.

» Continental Can Co. has completed a $750,000 plant at East Stockton, Calif., and has opened a modern new plant at Malden, Mass.

» Charles E. Green, 64, former president of American Can Co., died Feb. 10 at Cranford, N. J.

» Owens-Illinois Can Co. has elected Smith L. Rairdon vice-president and general sales manager and a director.

» Pfaudler Co., Rochester, N. Y., has completed a factory expansion program which has doubled the capacity of its Rochester plant.

» F. J. Stokes Machine Co., Philadelphia, has appointed Robert Platt representative in the Chicago territory.

Permeability to Moisture

(*Continued from page 132*)

preceding section. With this method members of a subcommittee are making cooperative tests of identical samples of the various types of wrapping materials. As scientific institutions and manufacturers of the different types of materials are represented in the cooperative effort, it is expected that the project will finally result in a mutually satisfactory standardized procedure. The packaging industry can then specify more adequately the required performance of the wrapping material.

There is need also for a method, whether simple or complex, that should be the acme of accuracy and reliability, to serve as a reference standard and as a research and development tool of greater precision. Methods C, D and E are probably better adapted to this purpose.

The use of a desiccant in a basket suspended from a quartz-fiber spring balance appears to have considerable merit, in that it affords a continuous indication of the transpiration of moisture without interruption of the constancy of the testing conditions. This technique should be applicable, either in an evacuated chamber, as described in method D, or at atmospheric pressure in a chamber properly ventilated, as in method C.

The particular merit of method C is the movement of air over both faces of the specimen. Various means of measuring the rate at which moisture passes through the specimen may be used in modified forms of apparatus making use of this method. The forced movement of dry air and moist air over the two faces of the specimen and the application of some sensitive and accurate method of measuring the transfer of moisture through the specimen from the moist to the drier stream are features that hold out considerable promise for the development of a reference standard for determining the permeability of wrapping materials to water vapor.

Quality Separation

(*Continued from page 138*)

with food manufacturers who were known to be skeptics. They were asked if there was anything in particular that such an investigation should bring out to be of special interest to them. There were, they admitted, a few points—technical, operating and economic.

Technical

One objection from non-users was that the salt brine would toughen or harden the peas. Nobody who uses quality grading in the group interviewed admits for one moment that the brine has any such effect. Indeed, one operator of a large number of plants made the following comment:

"If salt has a hardening effect on peas, then why should it be permitted in the brine in the cans?"

Operating and Economic

The problem of where to put a quality grader in a crowded plant remains unanswered except in principle. If the plant is not big enough it should be enlarged.

Another objection of more serious character is the belief that mechanized quality grading in the plant will imbue the field men with a notion that the factory can make up for their own shortcomings—that it will have a tendency to lull the field force into complacency—that field men will not need to be as alert as before to watch the progress of crops and harvesting, and initiate that very important factor of quality control, which is the field man's responsibility, namely, ordering the crop harvested at the right time.

Investigation has shown that exactly the opposite effect has been the outcome of installing quality graders in the plants. For the first time the work of a field man has been quickly measurable. And, now that the quality of his performance is reducible to figures, he is more on his toes than ever. As one operator put it—

"When a field man comes into the plant when we are running, the first thing he does is to go to the graders to see how the peas are running. He wants to know the percentage of 'rejects.' The machines give him a physical analysis of his work and he functions more intelligently because he can learn very quickly the total yield per acre and the breakdown in percentages of fancy, choice and so on. It is the greatest incentive to a higher morale we have ever seen."

Another comment at a smaller plant was the following—

"The greatest use of the quality grader is found when harvesting irregular fields, i.e. fields with an irregular stand. Heretofore we had to sacrifice yield to quality, now we can let the crops go until we can get the maximum—or rather the optimum yield—then harvest, and separate out the few hard peas that would have ruined the grade of the canned product in the old days."

"We don't yet know much about it," stated another canner. "We used the machines last year for the first time and decided to make some changes this year. But up to now the quality has been so good that we haven't had to use them. Everything looks like it will be strictly fancy, no matter what we do. Last year, during the drought, they helped a lot."

"Will you tell me what that machine is good for? You can't get any more money for fancies than you can for standards. So why put any more expense into them?" This man's machine was in its crate in the warehouse. It was not used in 1937.

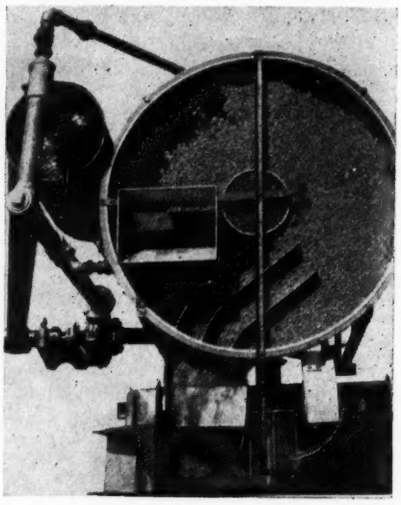


Fig. 15. Top view of a Lewis grader in action, showing rod screens for separating brine from peas on discharge end. Most of the peas here were floaters.

"We have had quality graders for several years—9 years to be exact. We would not think of running without them. The machines do not harden the peas. Certainly not as much as hard water. And, incidentally, we soften all our water used in brines to be sure we conserve the quality we get from Nature.

"You cannot operate a 'quality plant' any more unless you have quality separators. It's impossible to salvage a field afflicted with root rot without these graders. Root rot is the greatest curse of this state. No, we did not like our grader during the first year we had one, 1928, but we now know that the trouble was that we did not receive adequate instructions on how to operate them.

"The day has gone when you can raw-hide the field men to get the quality you want. We must take a reasonable view. Unless the yield per acre increases, we are going to have all kinds of trouble persuading the farmer to grow peas. His return for his labor cannot be sacri-

(*Turn to page 171*)

Quality Separation

(*Continued from page 147*)

ficed on the altar of quality, by ordering him to harvest a pea crop when it is so young that it will hardly yield him anything—or us, either.

"The cash credit that is due to the quality grader arises partially from our field operations. Here is a case in point. Last year we operated a plant that had no quality graders. This year we put them in. Last year (1936) our vining (shelling) costs, at 400 lb. shelled peas per acre, were 36 cents per 100 lb. This year, at 1200 lb. of peas per acre they are about 16 cents per 100 lb. This big swing is partly a credit to the quality grader because we did not have to sacrifice yield to get quality.

"And another thing. In this day and age you can't trust a farmer to skip any yellow spots in the field even though he has been definitely instructed to skip them." The speaker was in charge of four large plants.

"It is impossible for us to pack fancy quality without a quality grader. The reason is that, hereabouts, we have so many different soil types—even in a single field. No crop ripens uniformly. If we didn't use a quality grader we'd have no yield at all. And our unit of costs would go out of sight.

"Furthermore, anything that injures the plant will cause some over-ripe peas—such as drought on a hill-top or wetness in low places. The quality grader takes care of that for us."

"Yes, I've used quality graders for years. We wouldn't do without them. If I can't get a fancy price for fancy peas I ought to go out of business."

"We have used them for several years. We wouldn't do without them. They were a life-saver last year (1936)."

"Couldn't do without the machine. We can all the rejects without sifting them. The machine makes no difference to our field men—no let down."

A New Tool—What To Do With It

Mechanized quality separation is a fairly new tool for use in quality control. In the preceding installments of this series of discussions on the available equipment and its use, considerable explanatory matter has been mingled with the reporting of the facts.

Before closing the subject it is desirable to restate the essential facts of the place of quality separation in canning or freezing of vegetables. Heretofore, the canning industry solved the problem of getting the desired quality into the can by "practical" methods, such as good judgment of the quality of the raw material while it was growing. But, before the advent of the automatic separator, they had no accurate way to pre-judge the raw material quality. Tentative judgment had to wait for vindication until after the raw material was processed, i.e. canned.

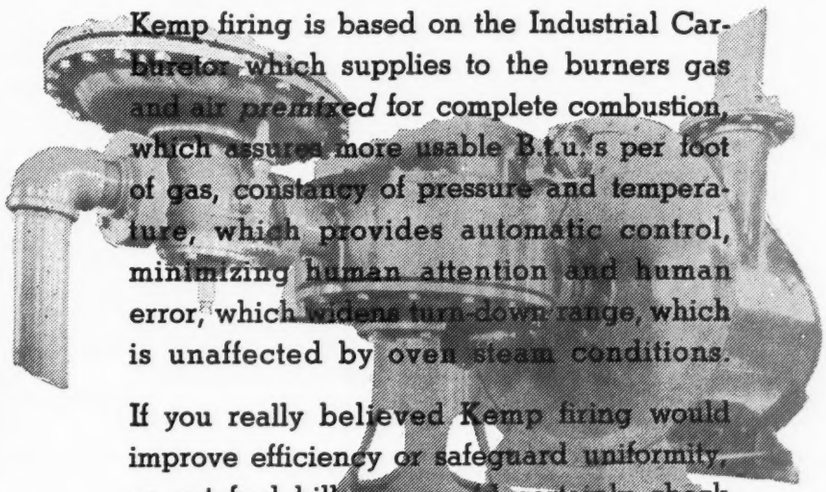
By the use of the quality separator, the quality-control picture has been markedly changed. The ability of field men and plant operators to discern the needed moves to secure best results have been greatly aided. Thus the separator gives a "pre-canning" opportunity to effect the necessary changes during operation to insure proper quality. It should be kept in mind that the separator merely separates—it does not create—quality. If the quality desired does not exist in the raw material it will not exist after it is divided into two or three parts by an automatic device.

The basic principle on which all

This Kemp message is addressed to the

BIG BAKER

Leaders have ordered and re-ordered Kemp equipment for travelling ovens, and use both direct and indirect firing with clean gas fuel.



Kemp firing is based on the Industrial Carburetor which supplies to the burners gas and air *premixed* for complete combustion, which assures more usable B.t.u.'s per foot of gas, constancy of pressure and temperature, which provides automatic control, minimizing human attention and human error, which widens turn-down range, which is unaffected by oven steam conditions.

If you really believed Kemp firing would improve efficiency or safeguard uniformity, or cut fuel bills . . . you'd certainly check into it, wouldn't you? Take it from other big fellows in baking, Kemp firing can do all three! For brass tack data, address . . . **The C. M. Kemp Manufacturing Company, 405 East Oliver Street, Baltimore, Md.**

KEMP of BALTIMORE

quality separators are designed is that peas which float in brine will *generally* be more tender than peas which sink in the same brine. For some curious reason, many canners believe that those which float in brine will be of "fancy" quality while those which sink will be "standard" or substandard quality. The foregoing sentence may or may not be true: it depends on the strength of the brine used. One cannot get "standard" grade peas out of a separator if there are no "standard" grade peas in the mixture fed into the brine, but one can get as many floaters or sinkers as he chooses by using a suitable brine. If the brine used is a 5-deg. sal. brine, practically all the peas will come out as sinkers; whereas, if a 100-deg. sal. brine is used they will all come out as floaters regardless of whether they are "Fancy" or "Standard" grade.

The choice of the right brine strength is up to the user of the machine, and all that the machine can do is divide a stream of peas into two component mixtures, one of which will be more tender than the other. If these two component mixtures are not exactly what the user wants, he can change the percentage of floaters and sinkers by changing the strength of the brine. And, what is very important to him, this change can be effected promptly without slowing down the operations of the plant.

Where the raw material (in this case peas) coming from the field is not of uniform quality the quality separator can be used to separate it into two grades, one of which will be much better than the other. If, as often happens early in a good season, the fields run quite uniform the use of the machine will not be as important as later in the season when they may run non-uniform.

When peas are put into a grader, it is preferable that they are wet. While it is not always necessary to have them wet, it is a safe rule to follow.

The decision as to the proper brine strength to use is one which must be made by the user of the machine. Nobody outside or away from the actual scene of operations can be able to do it. The machine maker cannot state definitely that a certain brine strength will give the desired percentage of sinkers and floaters.

Brine strength must be maintained constant at the figure decided upon by the user.

After the passage through the separator, the brine should be promptly washed off. Wherever peas are blanched prior to separating, adequate provision must be made to cool them before they enter the brine or else the brine will heat up. Also it will foam considerably more than cold brine.

As a final concluding remark, which may sound trite to some (or tripe to others), it should be borne in mind that a machine, such as an automatic quality grader, is not an effective substitute for salesmanship. How much profit the user will get from the quality grader or separator will depend considerably on his ability as a business man.

It is a pleasure to acknowledge the very material aid and criticism received from the five equipment makers, Mr. E. N. Wood, and the many canners whose operations were studied. Though this investigation is of primary interest to those who work with peas, beans and cut whole kernel corn, it has been approached as a study of the mechanical separation of substances which differ from each other by only slight differences of specific gravity.

Check these six Lo-Bax Facts
1
Kills bacteria QUICKLY — no faster killer on the market.
2
Dissolves quickly — makes CLEAR dairy rinse solutions.
3
Contains 50% available chlorine.
4
Does not lose its strength.
5
Solutions effective hot or cold.
6
Easy to use — low in cost.
WHY YOU NEED A DEPENDABLE QUICK-ACTING STERILIZER
Spoilage losses from bacterial contamination will take an enormous toll of profits in many food plants during 1938. Have you taken steps to safeguard *your* products by means of a rigid sanitary routine coupled with a dependable, quick-acting sterilizer like Lo-Bax? This convenient germ-killer is so economical that you can use it everywhere—on equipment, containers, floors, walls, ceilings. Write us for full information.
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Pioneer Manufacturers of Chlorine Products for Over Forty Years
FREE Measuring Spoons
HTH
LO-BAX
CONCENTRATED BACTERICIDE
FOR LOW BACTERIA COUNTS
AVAILABLE CHLORINE - 50%

Water Absorbing Power

(*Continued from page 140*)

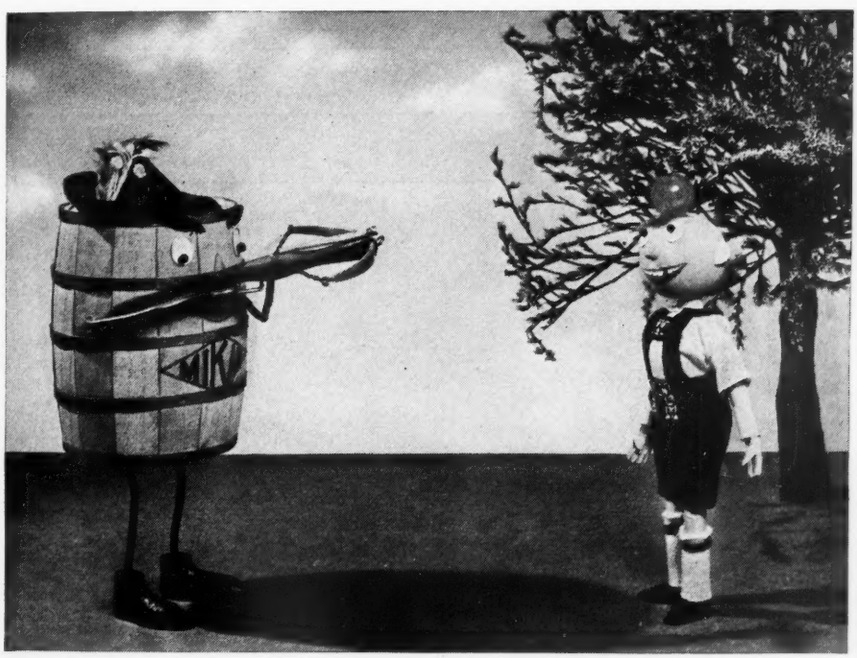
and 44 per cent in cottage and other hearth breads should be averages for British flours.

The question has been asked: "Can the miller control the water absorption of flour?" The answer is both "yes" and "no." When there is opportunity to choose between a number of types of wheat of sufficiently differing characters, and when there are available laboratory reports on the important qualities of these wheats, a well advised and carefully organized milling system can, in some measure, produce flours of "tailormade" absorption. In doing this it is necessary to have knowledge not only of the moisture and protein in the wheats used, but the quality of the glutens, the acidity and diastatic activity of the wheats and the baking characteristics of the flours produced by experimental millings of each wheat. Such information is not always at hand to guide the miller in making his decisions regarding mixes and, though it may be available, he cannot exercise complete control throughout the conditioning and milling processes and the subsequent storage condition.

The amount of added water, its temperature, the time for conditioning, the amount and kind of bleach given and the amount of malted flour added will all have greater or less influence on the absorption which the flour will have. But it must be emphasized that all of these and other factors relating to the milling process, excepting perhaps the malt flour addition, are relatively of small influence on the true absorptive capacity of the flour as compared with the qualities inherent in the wheats. These qualities vary from one locality to another or from one wheat variety to another and from one crop to another. The amount of moisture present in the flour is, to some extent, under the miller's control. But aside from the purely mathematical relationship of moisture content to absorption, the inherent absorption of the flour is not so much under his control as might be desired.

It appears more and more certain that the best procedure for the miller is to follow the rule expressed in previous articles (see Northwestern Miller, Dec. 9, 1925, and Oct, 10, 1934), in which the amount of water used for tempering is set at such a figure as will make sound, strong wheat come to the first break rolls with 15.50 per cent moisture; very strong wheat, with 15.75 per cent; weaker wheat, with 15 to 15.25 per cent; and soft wheats, with 14.50 per cent, or a little less, moisture. With wheats that contain some grown or fungous-diseased kernels, the moisture content at the start of the milling process may be a little lower. With wheats that are of low test weight, the moisture content probably need not be adjusted any differently from plump wheats of equal strength. I use the word "strength" in a rather loose sense as referring to the baking strength, or protein or gluten value, of the flour rather than to the protein of the wheat, which may not be quite so closely related to flour protein as when plump wheats are milled.

A bread wheat tempered in accordance with this rule and milled in a mill not humidity-and-temperature conditioned will yield, under average conditions, a straight flour, or several grades of flour averaged on a weighted basis, having about 13.5 to 14.5 per cent moisture. A flour that starts with 14 or 14.5 per cent



We Can't Afford to Miss!

The "Mikah Boys" have a reputation to maintain . . . a reputation of hitting the mark. It's not just coincidence that so many leading food packers are labeling and sealing with Mikah Glues exclusively.

National Adhesives Corporation

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and All Principal Cities

of moisture may be expected, under the conditions of humidity that generally prevail inland from the oceans or Great Lakes, to lose moisture rapidly unless closely confined in damp, unventilated warehouses. Depending also on the size of the sack, the mode of piling and similar factors, the moisture loss will go on at a diminishing rate until the flour moisture has reached equilibrium with the moisture in the air. The trend is generally toward a level of about 11 per cent. The loss of weight has frequently caused claims on millers for short weight. But the loss is merely water which by its removal helps to keep the flour in sound condition and can be put back into the flour when it is made into dough.

It is not a difficult mathematical calculation to show that a flour having 13.5 per cent moisture when packed contains 86.5 lb. of dry matter in every 100 lb., or 169.54 lb. per barrel. When the flour has dried until it has 11 per cent moisture, the original 100 lb. now weighs 97.2 lb. and of course, still contains the 86.5 lb. of dry matter. This is a loss of 2.8 per cent by weight, though the flour now has 2.5 per cent less moisture. The relationship between the loss of weight and the reduction in moisture may be expressed:

$$\text{Percentage of loss by weight} = 100 - \frac{(100\text{-original moisture }\%)\ 100}{(100\text{-later moisture }\%)}$$

The loss of weight is more than compensated by the increase in the yield of bread obtained as the direct result of the increased absorption and of the dried flour. In addition to this compensatory gain in absorption and bread yield, flours generally have a further gain as the result of changes that go on during aging. The absorption that a flour will have when aged cannot be calculated even if its absorption and moisture content before aging and its moisture content after aging are known, but we can accurately calculate its absorption upon an increased or decreased moisture basis by use of the following formula which, it will be noted, is not the same as the formula for calculating the amount of a constituent like ash or protein upon another moisture basis.

The absorption upon a specified moisture basis = (absorption per cent as found + present moisture) $\times$ $\frac{\text{100-desired moisture basis}}{\text{100-present moisture content}}$ — desired moisture basis.

The dry basis and regain mode of expressing weight and moisture percentage has very definite advantages for the textile weaving and paper making industries. Under this system, standards of water content are based on the regain, which is the water calculated as additional to the dry matter. Thus the standard for silk is 11 per cent regain, equivalent to 9.91 per cent moisture. It might not be a bad idea for the milling industry to adopt this system of sales and some convenient standard of regain. The equivalent of 11 per cent moisture is 12.36 per cent regain. The suggestion was once made by Dr. Ladd, senator from North Dakota, that a barrel of flour should be defined as 174 lb. of dry matter. This would certainly be excessive. It would be equivalent, for example, to packing 202.3 lb. of flour containing 14 per cent moisture, or 196 lb. with 11.2 per cent moisture. A fairer figure would be 169 lb., equivalent to 196 lb. at 13.8 per cent moisture, which would be 16 per cent regain. Though there are difficulties in the way, the official adoption of some such definition would do away with some of the uncertainty in transactions.

Efficient PRODUCTION . . . *plus* Sales-winning APPEARANCE

All of these various-sized packages are wrapped on one adjustable FA Machine.

Model FA Carton Wrapping Machine. Adjustable for a wide range of sizes . . . handles transparent cellulose, glassine, waxed paper, foil, and other types of wrapping material.

Here is a good example of efficiency in production, plus sales-winning appearance in wrapping. All of these products of the Megowen Educator Food Co., are wrapped on our FA Machine. It takes but a few minutes to change the FA from one size package to another. Simple in construction, easy to operate, and fast, the FA ideally combines all of the features conducive to smooth production—low operating cost.

Note the attention value of the wrapped products above. Neat attractive packages that indicate quality . . . packages that display the product, itself, creating appetite appeal. Note, particularly, the packages with the wrapper neatly rounded over the top of the crackers . . . an example of how well the wrapping may be adapted to the character of the product.

It will pay you to investigate a machine that offers substantial savings as well as significant selling advantages.

See our Exhibit at the Eighth Packaging Exhibit
Palmer House, Chicago, Booth 302—Mar. 22-28

PACKAGE MACHINERY COMPANY, Springfield, Massachusetts
NEW YORK CHICAGO CLEVELAND LOS ANGELES
Peterborough, England: Baker Perkins Ltd. Melbourne, Australia: Baker Perkins Pty., Ltd.
Mexico, D. F., Apartado 2302 Buenos Aires; Argentine: David H. Orton, Paipu 231

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Elimination of Air . . .

(*Continued from page 142*)

and with the size of the bottle. This

CO_2 Present, Expressed in Volumes

Temperature deg. F.	No Air	5 cc. Air	10 cc. Air	20 cc. Air
40	2.61	2.74	2.87	3.03
65	2.55	2.61	2.66	2.75
90	2.48			

merely serves to show the degree of accuracy of the test.

Perhaps the most annoying result of the presence of air in carbonated products is the effect on the bottling speed. When carbonated water enters a relatively warm bottle there is a tendency for some gas to be released from solution. If air is present this tendency is more marked. The very tiny bubbles remain in suspension during the whole time that the bottle is being filled. When the pressure is finally released and the contents of the bottle is reduced to atmospheric pressure, these small bubbles of air expand, rise rapidly and carbon dioxide rushes out at the same time causing the bottle to foam over. If the filling rate is sufficiently slow, these small bubbles will have time to work their way out of the liquid or go back into solution; but as the bottling speed is increased there is less and less time for this to take place. Thus the bottling speed is often limited by the amount of air present.

The air that finally goes into the bottle with the product comes from a number of different sources. Water at 40 deg. F. can dissolve about 25 cc. of air per liter. There are times when the water supply may be practically saturated with air. In testing for air, it is more customary to test for dissolved oxygen than for total air for this can be done by a relatively simple chemical test. The total air is roughly three times the amount of dissolved oxygen.

If water is introduced into a carbonating device with 25 cc. air per liter in it, it will be extremely difficult to eliminate any great proportion of this air without blowing off a very large amount of carbon dioxide in the process. This is made the more difficult by the fact that commercial carbon dioxide, even the purest obtainable, is not absolutely pure. A very high grade gas is 99.7 per cent pure. In other words 3 cc. in every liter of gas used is air or some other gas, not carbon dioxide. If the carbonation is to be 3.0 volumes, three liters of gas will be used for every liter of water and this introduces 9 cc. of air for each liter of water.

Some of the air is eliminated in the carbonator and some goes into solution. Eventually it finds its way into the bottle having perhaps picked up a little more air on the way due to the counterpressure of air both in the filling machine and in the bottles themselves. The bottles are filled and when the filling tubes of the automatic filling machine are withdrawn from the bottles, air fills the space that is left. The air introduced at this point may be as great or greater than from all other sources.

The elimination of air from carbonated products is not an entirely simple matter. A proper method of deaeration must be used and then the product must be handled in such a manner that air cannot be reabsorbed. Elimination of absolutely all air is not practical but a substantial reduction of the amount of air is both feasible and helpful.

Treating Package Materials

(*Continued from page 129*)

benefits when using Avenized parchment with butter stored at 45 deg. F. are obtained within a three to five-week period which is generally recognized as the normal time for which butter is held at this temperature during its stages of final distribution.

The following report was made as a result of the work completed at The Pennsylvania State College:

"Avenex treated parchment is quite effective in preventing staleness of butter stored at 45 deg. F. with maximum benefits obtained in three to five weeks. Some slight help is noted in butter stored at minus 15 deg. F. for five to six months.
"The scores in general were about one-half point higher in the treated sample after two weeks in storage at 45 deg. F. The difference in score increased to approximately one point at some stage of the storage period in most series, but the difference in most cases was less again after six weeks to two months at 45 deg. F."

From the University of Illinois the following was reported:

"The score of the surface butter was from a quarter to a whole point higher, while the inside of the Avenized parchment print was scored, on the average, approximately a quarter point higher than butter wrapped in plain parchment. It is hard to explain how protecting the surface of a butter also protects the interior from oxidation unless one assumes that the oxidized butter on the surface acts as a catalyst and accelerates oxidation throughout the sample."

Similar observations were made at the Oklahoma A. & M. College indicating that, "the butter wrapped in Avenized parchment was better than the control all through the test period."

The significance of these results becomes increasingly important when it is realized that the range of the total scoring of butter rarely varies beyond an eight point spread, and that every point in the butter score is of real importance to the butter maker and distributor.

In a similar manner, Avenized parchment and greaseproof paper may be used for the wrapping of lard and bacon. A recent report of the work conducted by the Animal Husbandry Department of the University of Illinois confirmed the fact that "the use of Avenized paper as a liner for lard cartons inhibits the development of rancidity during storage.[6] Other publications have appeared on the use of this treated parchment for the wrapping of lard, reporting an improvement in the keeping quality of lard in contact with it over lard wrapped in ordinary parchment.[3,7]

Moreover, at the April, 1937, Midwest Regional Meeting of the American Chemical Society a preliminary report was read covering work done at the Oklahoma A. & M. College using Avenized parchment for the wrapping of bacon. This described an improvement in the keeping quality of the packaged bacon.[8]

Considerable work has also been done with Avenized glassine liners for coffee bags. Over a period of six months blind tests were conducted with no less than fifty samples of coffee packed in Avenized and regular bags. In practically every case a distinct and uniform improvement in the keeping quality of the coffee packed in the treated liners was observed.

Avenized cardboard materials are also being used for the packaging of whole wheat biscuits, with which the development of "board odors" and oxidized flavors is common. Extensive tests have indicated that even though the contact of the treated board with the biscuits is only relatively slight, there is nevertheless a pronounced protective effect and a material improvement is observed in retarding the objectionable off-flavors.

No attempt is made in this paper to develop the possibility for using these treated papers for such other fat-containing products.

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droplets to condense (chloroform or pentachloroethane is suitable), and the casing is dried in an atmosphere of the vapor of the same solvent.

MISCELLANEOUS

Self-filtering Coffee

COFFEE which can be used in coarsely perforated percolators without letting the grounds into the beverage is prepared by grinding coffee fine, then granulating the powder. As the invention is described in German Patent 649,630 (granted Aug. 28, 1937, to R. Seelig und Hille, Dresden), the powdered coffee is granulated by being moistened with about 2.5 per cent of a 50 per cent sugar solution and then mixed with about 2 per cent of a 5 per cent solution of a relatively insoluble carbo-hydrate gum which contains bassorin. Of the various gums which are suitable for this purpose, cherry gum and gum tragacanth are the most readily available. Before the treatment the ground coffee may be screened to separate coarse and fine particles, which may be treated separately, or the method may be applied to all the ground coffee without separation. When thus granulated, coffee is retained well even in coarse percolators, and there is no loss in palatability. Bassorin, the important gum constituent, is a complex carbohydrate which swells enormously in water.

UNLESS the slime, dirt and other muck that accumulates on the mushroom grader of this particular canner are removed at the end of the day's run, these deposits dry hard and then are tough to get off. Cleaning every day is necessary . . . quick, dependable, *thorough* cleaning.

Steam cleaning is relied on. But it wasn't until an Oakite material was recently adopted that cleaning results came up to the superintendent's expectations.

It Pays to Change Over to Oakite

Now everything is fine . . . no need for going over the same surfaces twice. Slime, dirt and muck are quickly and thoroughly removed as if by magic.

Perhaps an Oakite material can pep up your steam cleaning too. Or, if you want to know if steam cleaning is applicable to your requirements, just let us know. Write . . . there's no obligation.

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OAKITE CERTIFIED CLEANING
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MATERIALS & METHODS FOR EVERY CLEANING REQUIREMENT

New Facts About Quality of Rice

A THEORETICAL STUDY of the reversible absorption (sorption and desorption) of water vapor by rice grains has brought to light the unexpected fact that high-grade and low-grade varieties of rice differ widely in this respect. On this basis, a new test has been developed for judging the quality of rice samples. Tests were made by drying various rices in a stream of hot air, and also in vacuum over phosphorus pentoxide. In other tests, sorption and desorption were measured under isothermal conditions. Better grades of rice both absorb and give up water vapor more easily and rapidly than do the poorer grades. Closer investigation revealed that the fundamental reason for this difference in behavior lies in the fact that the better varieties of rice have wider capillaries in the grains than do the poorer varieties. Age of the grains after harvesting was also found to be a factor which must be taken into consideration. Thus, rice prepared from paddy improves with age, so that the stored rice absorbs and gives up water vapor more readily than when freshly harvested. This indicates a widening of the capillaries with age, and approach of the poorer rices toward the higher-grade rices in quality.

Digest from "Physical and Chemical Study of Rice Varieties," by K. Subbaramiah and R. S. Rao, *Proceedings of the Indian Academy of Sciences*, Sec. A, 6, 36 (1937). (Published in India.)

Libyan Date Paste

DATE PASTE, a concentrated food product much used by natives in North Africa, is made by seeding and pressing dried dates. It retains all the nutritive and organoleptic qualities of dried dates. Its color is a more or less dark yellow, depending on the quality and ripeness of the dates from which the paste was made. There is no apparent change in flavor or odor from the dried dates. The paste con-

tains about 16 to 20 per cent moisture, and 76 to 80 per cent dry matter. The total sugar content (nearly all invert sugar) ranges from about 56 to 67 per cent. Other components include 1.7 to 1.9 per cent crude fiber, 1.6 to 2.3 per cent ash, 1.7 to 2.2 per cent protein and 0.3 to 0.5 per cent ether extract.

One difference from dried dates can be detected chemically, in a slightly increased acidity. In the paste the acidity ranges from about 3.2 to about 7.2 per cent (volume of **N** sodium hydroxide for neutralization). The small increase is not distinctly perceptible to the taste in comparison with whole dried dates.

Digest form "Composition of Libyan Date Paste," by Spartaco Copertini, *L'Industria Italiana delle Conserve Alimentari*, 12, 150 (1937). (Published in Italy.)

Two-Part Potato Flour

LIKE MANY OTHER SEEDS, fruits and vegetables, the potato has some of its most valuable nutritive elements more or less concentrated in or immediately adjacent to the skin. Various procedures have been employed for making whole potato products, mostly by low-temperature drying (or vacuum roasting) and grinding. A recent process differs from the others in that it recognizes the distribution of minerals and other valuable components, and separates the potato in two parts (peel and flesh). The peel is dried in vacuum at a moderate temperature and ground to flour. This product has many uses in food preparations as a vehicle for the minerals, vitamins, etc., of potatoes. It may be blended with cereal flours, or used in cocoa, soups and other preparations. The other part of the potato, the flesh, can be used for food or in the manufacture of potato starch. The new method provides a profitable outlet for potato peelings, hitherto useful only in stock feed.

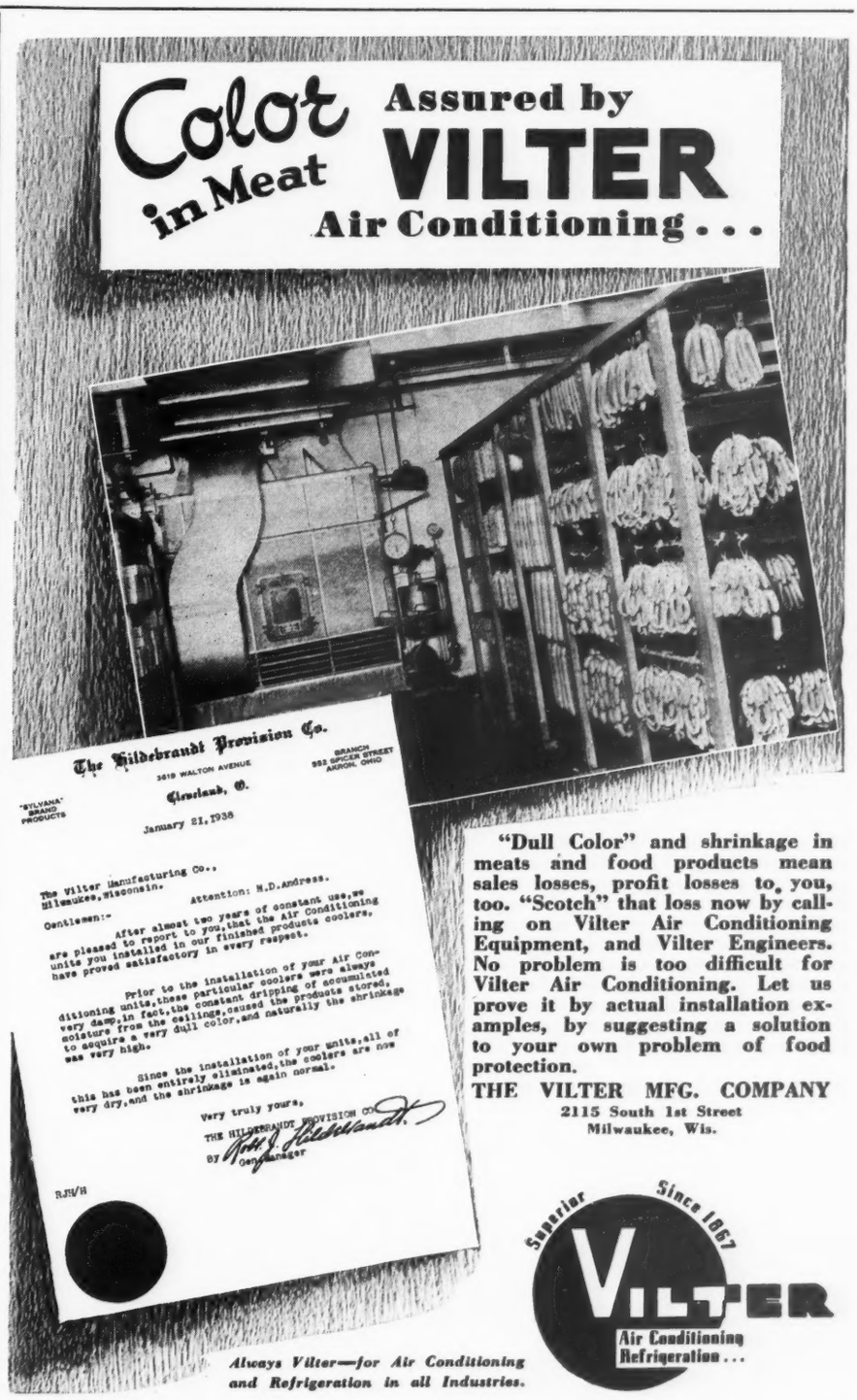
Digest from "Better Domestic and Industrial Utilization of Potatoes," by Gustav Schuchardt, *Chemiker-Zeitung* 61, 960, 1937. (Published in Germany.)

Citric Acid From Cane Juice

IN THE SEARCH for cheap citric acid, the possibility of utilizing cane juice directly was investigated in the hope that the expense of preparing sugar before fermentation could be avoided. It was soon found that cane juice (isolated by the diffusion method) does not have the composition needed for the citric acid fermentation. The principal difficulties are high natural phosphate content and a deficiency in nitrogen and in natural buffer substances. The juice can be buffered artificially, but the other defects must be overcome if incomplete or faulty fermentation (e.g., formation of oxalic instead of citric acid) is to be avoided.

Comparison of reagents for altering the composition in the desired directions brought out a particularly effective but simple procedure for lowering the phosphate content and raising the nitrogen content at the same time. The diluted cane juice is heated at 80 deg. C. (172 deg. F.) with slightly more than enough barium hydroxide to precipitate all the phosphate. Then, to get rid of the excess barium, more than sufficient ammonium sulphate is added for precipitating the barium as the sulphate. Thus phosphate has been removed, and the remaining ammonium sulphate supplies the needed nitrogen. In the light of these experimental results cane juice is potentially an active competitor of beet molasses for making fermentation citric acid.

Digest from "Citric Fermentation of Sugar Cane," by A. Quilico and L. Panizzi, *Chimica e l'Industria* 19, 629, 1937. (Published in Italy.)


Color in Meat
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January 21, 1938
The Vilter Manufacturing Co.,
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Attention: M.D.Andress.
Gentlemen:-
After almost two years of constant use, we are pleased to report to you, that the Air Conditioning units you installed in our finished products coolers, have proved satisfactory in every respect.
Prior to the installation of your Air Conditioning units, these particular coolers were always very damp, in fact, the constant dripping of accumulated moisture from the ceilings, caused the products stored, to acquire a very dull color, and naturally the shrinkage was very high.
Since the installation of your units, all of this has been entirely eliminated, the coolers are now very dry, and the shrinkage is again normal.
Very truly yours,
THE HILDEBRANDT PROVISION CO.
BY John J. Hildebrandt
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"Dull Color" and shrinkage in meats and food products mean sales losses, profit losses to you, too. "Scotch" that loss now by calling on Vilter Air Conditioning Equipment, and Vilter Engineers. No problem is too difficult for Vilter Air Conditioning. Let us prove it by actual installation examples, by suggesting a solution to your own problem of food protection.
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BOOKS RECEIVED

How to Handle Grievances. By Glenn Gardiner, Forstmann Woolen Co. Published by Elliott Service Co., 219 E. 44th St., New York, N. Y., 1937. 52 pages; 5½x7¾ in. Price 60 and 45 cents, with cloth and paper binding, respectively; lower price in quantities over ten.

Practical suggestions on how to handle employee complaints without impairing industrial relations. Useful to all who handle workers, from company president to foremen.

Vitamins in Canned Foods. By E. F. Kohman. Fourth Revision, Bulletin No. 19-L, Research Laboratory, National Canners Association, Washington, D. C., 1937. 95 pages; 6x9 in.; paper. Free.

This revised edition brings up-to-date this summary of the work that has been done in determining the vitamin content of various canned foods. It is of distinct value to the dietitian, as well as to the food canner who needs the information it contains as a guide to both his manufacturing and advertising operations.

Laboratory Manual—Methods of Analysis. Edited and arranged by J. C. Fridenberg. Published by American Butter Institute, 110 N. Franklin St., Chicago, Ill., 1937. 48 pages; 6x9 in.; celluloid and board, flexible binding. Free.

This new manual has been prepared for the purpose of making available, to members of the American Butter Institute and to the creamery butter industry as a whole, the latest laboratory methods of analysis. It covers methods for both production and quality control. Sections are provided on sampling; determination of yeasts and molds; determination of moisture, fat, salt and curd in butter; pH of butter sera; determination of diacetyl and acetylmethylcarbinol in butter and butter starters; testing of milk, skim milk, cream and butter for sediment; determination of titratable acidity of cream; testing of milk, cream, skim milk, buttermilk by the Babcock method; practical determination of keeping quality in butter; and checking of acidity and salt test solutions.

This manual does not include the official methods of analysis as used by Federal and State authorities. Rather, it gives those practical and quick and reliable procedures which do not require such costly equipment, which are not so time-consuming and which can be operated by others than trained chemists.

Nickel as a Catalyst. By O. B. J. Fraser. Published by The Electrochemical Society, Broadway and 119th St., New York, N. Y., 1937. 62 pages; 6x9 in.; paper. Oil and fat hardening, miscellaneous organic hydrogenations, dehydrogenation and polymerization of organic compounds, isomerization, esterification, hydration and dehydration, oxidation of oils and fats, bleaching, waste water purification and miscellaneous organic reactions are among the subjects touched upon.

Use of Motor Trucks in Marketing Fruits and Vegetables. By Marius P. Rasmussen, New York State College of Agriculture. Published by the Farm Credit Administration, Washington, D. C., 1937. 120 pages; 6x9¼ in.; paper. Price 15 cents; for sale by Superintendent of Documents, Washington, D. C. An analysis of the experience of growers, cooperative associations and others in nine states tributary to the New York market.

Studies on Trichinosis—IV The Role of the Garbage-Fed Hog in the Production of Human Trichinosis. By Maurice C. Hall, United States Public Health Service. 14 pages; 5⅞x9⅛ in.; paper. Price 5 cents; for sale by Superintendent of Documents, Washington, D. C.

PATENTS

Sausage Packaged in Hydrated Fibrous Paper Casing Which Has a Skin-Like Translucency—Gustav Sachsenröder, Wuppertal-Barmen, Allee, Germany. No. 2,101,958. Dec. 14, 1937.

Fruit Extract Concentrates and Flavors Prepared by Steeping Fruit Material in Cool Acidulated Menstruum Giving an Extract of Between pH 2.0 and 2.5—William E. Stokes, Brooklyn, and Margaret H. Kennedy, New York, N. Y., to Standard Brands Inc., New York, N. Y. No. 2,101,962. Dec. 14, 1937.

Lactic Acid Purified by Treatment With Small Amount of Nitric Acid, Heat, Addition of Small Amount of Activated Carbon and Heat Again—Ivan L. Haag, Lakewood, and Charles A. Vana, Cleveland, Ohio, to E. I. du Pont de Nemours & Co., Wilmington, Del. No. 2,010,998. Dec. 14, 1937.

Fat- and Oil-Splitting Enzyme, Isolated from Oil-Bearing Seed Material by Treating With a 0.6 to 1.2 Normal Solution of an Acid—Etsuo Takamiya, Moji, Japan. No. 2,102,101. Dec. 14, 1937.

Beer Packaged in Tin Cans Lined With Petroleum Wax Having a Melting Point Above 140 Deg. F.—Alfred L. Kronquest, Syracuse, N. Y., to Continental Can Co., Inc., New York, N. Y. No. 2,102,208. Dec. 14, 1937.

Enzyme Preparation Having a Lichenase Value of 0.5 to 1.0 and Capable of Splitting Cellulose and Hemi-Cellulose Prepared From Molds Grown on a Non-Alkaline Nutrient Medium to Beyond the Mycelium Stage and Just Short of Spore-Forming Stages—Wolfgang Grassmann and Hans Rubenbauer, to August Karreth, Munich, Germany. No. 2,102,315. Dec. 14, 1937.

Brewers Grain Mashed in a Tub Equipped to Give a Side Bottom Discharge—Robert C. Schock, New Rochelle, N. Y., to Shock, Gusmer & Co., Inc., Hoboken, N. J. No. 2,102,385. Dec. 14, 1937.

Perishable Foods Preserved by Freezing in Liquid Mediums Consisting of 20 to 40 Per Cent Pure Glycerine, 20 to 40 Per Cent Ethyl Alcohol and 25 to 45 Per Cent Water Cooled to at Least —30 Deg. C.—Frederick Oliver Smith Bland, Hamburg, Germany. No. 2,102,506. Dec. 14, 1937.

Cheese Coated With Uniform Mixture of 50 to 85 Per Cent White Scale Wax at a Melting Point of 120 to 130 Deg. F. and 15 to 50 Per Cent Petroleum Wax Having a Melting Point of From 130 to 140 Deg. F. Which is Flexible in Thin Layers at Ordinary Storage Temperatures and has a Melting Point of 130 to 140 Deg. F.—Henri Jan Coster, The Hague, Netherlands to Special Products Co., Chicago, Ill. No. 2,102,516. Dec. 14, 1937.

Milk Partially Freed From Calcium and Phosphate Ions by Acidification and Treatment With Solution of Water-Soluble Silicate—Herbert E. Otting, Westerville and Edwin H. Browne and Maurice E. Hull, Columbus, Ohio, to M. & R. Dietetic Laboratories Inc. No. 2,102,642. Dec. 21, 1937.

Roasted Coffee Vacuum Packed in an Air- and Moisture-Resisting Container Made of Laminated Material That is Non-Reactive to Coffee Oils and Capable of Being Collapsed and Compressed Into an Heat-Sealed Solid and Rigid Package—Samuel H. Berch, Beverly Hills, Calif. No. 2,102,716. Dec. 21, 1937.

Fruit and Vegetable Juices Expressed in a Screened Drum Machine Equipped With a Rotary Beater Blade Type Agitator Which Propels the Residue Mass Towards the Discharge Outlet as the Juices are Liberated—Harold R. Lewis, Baltimore, Md., to Food Machinery Corp., San Jose, Calif. No. 2,102,961. Dec. 21, 1937.

Chocolate Coated Candies Placed in Varied Colored Individual Paper Cups During Packing for Identification as to Nature of Centers—Gordon A. Petremont, Boston, Mass., to The Gobelin Co., Inc., Cambridge, Mass. No. 2,102,971. Dec. 21, 1937.

Sausage Containing Package. Formed From Synthetic Casing Material Closed by Knot of Casing Material Reinforced by Cord Passing Through Knot—Henry A. Hensel, Milwaukee, Wis., to Visking Corp., Chicago, Ill. No. 2,103,258. Dec. 28, 1937.

Poultry Stunned or Killed By Electricity—Wilber V. Hunt, North Acton, Mass. No. 2,103,288. Dec. 28, 1937.

Cheddar Cheese Plasticized by Addition of From 1 to 5 Per Cent of an Alkaline Caseinate and an Edible Urea Compound Followed by Heat Treatment—George Lincoln Teller and W. Kedzie Teller to Henry H. Doering, Chicago, Ill. No. 2,103,304. Dec. 28, 1937.

Spaghetti Cut Into Desired Length by Mechanical Means—Nicholas J. Cavagnaro, Richmond Hills, N. Y., to Consolidated Macaroni Machinery Corp., Brooklyn, N. Y. No. 2,103,317. Dec. 28, 1937.

Milk Stabilized Against Separation by Addition of Small Quantity of a Mixture of Colloidal Stabilizer and a Salt of an Earth Alkali Metal—Alexander Frieden, New Rochelle and Sanford Joseph Werbin, Woodhaven, N. Y., to Stein, Hall & Co., Inc., New York, N. Y. No. 2,103,411. Dec. 28, 1937.